Annexure I
K/W-1

BANGALORE WATER SUPPLY AND SEWERAGE BOARD

CAUVERY BHAVAN, KEMPEGOWDA ROAD,
BANGALORE – 560 009

DTP FOR THE WORK OF

Tender for the work of construction of Bridge near storm water drain at 5 MLD Kaggadasapura coming under EE(WWM-P)-K&T Valley Division (2nd **Call).**

(Through KPPP portal only)

http://www.kppp.karnataka.gov.in

Office of the Executive Engineer,
BANGALORE WATER SUPPLY & SEWERAGE BOARD
Waste Water Management-Project DIVISION,
Kapila Bhavan, 2nd floor, 11th main, 35th cross,
4TH T BLOCK, JAYANAGAR, 560041.

email – eewwmpkt@bwssb.gov.in

TENDER REFERENCE :	:	BWSSB/EEWWM-P-K&T Valley/TO/PB/ /2024-25 Dated:	
PERIOD OF SALE OF TENDER DOCUMENT	:	From:	To:
LAST DATE FOR SALE OF TENDER DOCUMENT	:		
LAST DATE AND TIME FOR RECEIPT OF TENDERS	:	@ 16:00 Hrs	
PLACE OF OPENING OF TENDER	:	Office of the Executive Engineer, Waste Water Management-Project Division, BWSSB, Kapila Bhavan, 2nd floor, 11th main, 35th cross, 4th T block, Jayanagar, Bangalore-560041.	
TIME AND DATE OF OPENING OF TENDERS	:	after 15.00 Hrs	
ADDRESS FOR COMMUNICATION	:	Office of the Executive Engineer, Waste Water Management-Project Division, BWSSB, Kapila Bhavan, 11th main, 35th cross, 4th T block, Jayanagar, Bangalore-560041 email – eewwmpkt@bwssb.gov.in	

Contents

Section	Description	Page No.
1	INVITATION FOR TENDERS (IFT)	4
2	INSTRUCTIONS TO TENDERERS (ITT)	7
3.	FORM OF TENDER AND QUALIFICATION INFORMATION	16
4.	CONDITIONS OF CONTRACT (CC)	20
5.	CONTRACT DATA	32
6.	SPECIFICATIONS	34
7.	DRAWINGS	34
8.	BILL OF QUANTITIES	35
9.	FORMAT OF BANK GUARANTEE FOR SECURITY DEPOSIT	40

SECTION 1:

BANGALORE WATER SUPPLY AND SEWERAGE BOARD

Office of the Executive Engineer,

BANGALORE WATER SUPPLY & SEWERAGE BOARD

WWM-P-K&T Valley, Kapila Bhavan, 2nd Floor,

4TH T BLOCK, JAYANAGAR, 560041

Email:eewwmpkt@bwssb.gov.in

INVITATION FOR TENDER 2nd Call

(ONLY THROUGH KPPP PORTAL) www.kppp.karnataka.gov.in

IFT No: BWSSB / EE(WWM-P)-K&T /TO/ PB / /2024-25 DATED:

For and on behalf of the Bangalore Water Supply and Sewerage Board, **SHORT TERM ITEMWARE TENDER is** invited through e-procurement process with tender procedure in line with Rule 28 of the KTPP Act by the Executive Engineer, Water Supply and Sanitary Division (South-West), 4 'T th block, Jayanagar, Bangalore-56011 for the following work from registered Agencies of appropriate class as indicated against each work of **BWSSB/KUWSDB/KPWD,** etc. Who are having adequate financial resources, past experience in similar nature of work possessing valid GST registration, The Board keeps the right of acceptance or rejection of any tender without assigning any reasons.

The Tenderers are required to pay the Earnest Money Deposit only through e-procurement portal only using any of the four modes.

1. (1)Credit Card (Online Payment) (2) Direct Debit Using Internet Banking (Online Payment) (3) Remittance at the Bank Counter - Challan (Offline Payment) (4) NEFT (National Electronic fund transfer) (Offline payment). The details regarding their capability to undertake the tender (as detailed in ITT Clause 4) and the price tender shall be uploaded in the website. Technical details will be opened on the date and time mentioned in IFT clause 6 and evaluated. The price tender of the Tenderer, who is found to be qualified to execute the tendered works, will be opened on the date notified later. The Tenderers are advised to note the minimum qualification criteria specified in Clause 3 of the Instructions to Tenderers to qualify for award of the contract.

2. Tender documents may be downloaded from www.kppp.karnataka.gov.in website only. Interested tenderers may obtain further information at the same address.

3. Additional information related to e-kppp process can be obtained through the above mentioned website or contact kppp helpdesk No.**080-2550 1216 / 2550 1227**. The electronic tender comprising Technical and Financial bids will be operated as **Single Stage Tender system.**

4. Bidders can access tender documents from **to** through www.kppp.karnataka.gov.in website only and upload the required details; those are mentioned in different sections in the bid document in to electronic tender on the website. Scanned documents those are required to be furnished as per Section 2, 3 & 4 of the bid document shall be submitted through kppp.

5. The Tender processing fee once paid will not be refunded.

6. The Last date and time for Receipt of tenders will be on upto 16:00Hrs **and the date of opening of tender will be on after 15.00 Hrs.**

TABLE

Sl. No	Name of work	Amount put to tender	Earnest Money Deposit @ 2.5%	Tender Processes sing fee	Period of Completion of work	Eligibility Class of Contractor
1	Tender for the work of construction of Bridge near storm water drain at 5 MLD Kaggadasapura coming under EE(WWM-P)-K&T Valley division 2nd Call)	**Rs.9,68,565/- Exclusive of GST**	**Rs.24,214 /-**	**As per KPPP portal**	2 Months	Civil Contractor

The Eligibility criterion for the above work is as follows:

- The tender is based on Single Cover System
- Contractors should have Civil Contractor registration in BWSSB or KPWD/KUWSDB, etc.
- **Assessed available tender capacity = (A*N*2.5 - B) >11.42 Lakhs (Including GST).**
- Form of tender is mandatory to upload in KPPP portal.
- **Amount put to tender is exclusive of GST.**
- **Rates Quoted shall be exclusive of GST.**
- **Cutting Road Surfaces for Pipe line trenches should be executed using machineries only.**
- **Qualification Information: -**

a) Profit & Loss Statement certified by Chartered accountant for a minimum period of Two Years upload in KPPP portal
b) Existing commitments on going Works upload in KPPP portal
c) Works for which tenders already submitted upload in KPPP portal
d) ITR for a Minimum period of Two financial years upload in KPPP portal.

7. The successful bidder would be required to give performance **bank guarantee of 5%** of the contract amount plus additional security for unbalanced bid amount from a Nationalized / Scheduled Indian Bank, with jurisdiction at Bangalore as specified, towards guarantee for completion of work within the stipulated period.

8. Applications / requisitions from joint venture Firms are not acceptable.

9. Bangalore Water Supply and Sewerage Board (BWSSB) reserve the right to cancel or annul the entire or part of this process of invitation at any time without assigning any reason.

10. For any additional information regarding the above tender, the firms who are interested to quote, may contact office of the undersigned at the office address given below on all working days during office hours (10:30hours to 17:00 hours).

11. List of documents to support qualification of bidder is to be uploaded to the e-procurement website www.kppp.karnataka.gov.in

12. All other conditions put forth as per KW-1 of KTPP act shall be followed read with amendments vide G.O No.FD4PCL 2008 Bangalore Dt:14.10.2008

13. Bidders shall submit offers that comply with the requirements of the bid document, including the basic technical design as indicated in the drawing and specifications. Alternatives will not be considered. The attention of the bidders is drawn to clause 23 regarding the rejection of the bids, which are not substantially responsive to the requirement of the bid document.

14. Other details can be seen in the tender documents.

15. The works to be executed in accordance with the contract documents and to carry out all the works as per the guidelines in the "Safety Manual for construction and maintenance of UGD Lines and septic tanks in Urban Areas -2013". Any lapses in following the safety guidelines, the contractor/agency/firm will be held solely responsible.

Further details may be had from this office during the office hours on all working days.

Corrigendum/Addendum/Modification/corrections, if any, will be published in the Web site only.

Executive Engineer
WWM-P-K&T Valley Division
BWSSB, Kapila Bhavana, 2nd Floor11th main,
35th cross, 4th T block, Jayanagar,
Bangalore-560041.

SECTION 2: INSTRUCTIONS TO TENDERERS (ITT)

Table of Clauses

A. General **Page No.**

1. Scope of Tender 8
2. Eligible Tenderers 8
3. Tender Capacity 8

B. Tender Documents

1 4. Content of Tender documents 9
5. Amendment of Tender documents 9

C. Preparation of Tenders

6. Documents comprising the Tender 9
7. Tender prices 9
8. Tender validity 10
9. Tender Processing Fee and Earnest money deposit 10
10. Format and signing of Tender 10

D. Submission of Tenders

11. Tendering through E-procurement system: 11
12. Deadline for submission of Tenders 11
1 13. Late Tenders 11
2 14. Modification and Withdrawal of Tenders 12

E. Tender opening and evaluation

1
2 15. Tender Opening 12
16. Process to be confidential 12
17. Clarification of Tenders 12
18. Examination of Tenders and determination of responsiveness 13
19. Correction of errors 13
20. Evaluation and comparison of Tenders 13

F. Award of contract

21. Award criteria 14
22. Employer's right to accept any Tender and to reject any or all Tenders 14
23. Notification of award and signing of Agreement 14
24. Security deposit 14
25. Corrupt or Fraudulent Practices 15

A. General

1. Scope of Tender

The Executive Engineer [*Referred to as Employer in these documents*] invites tenders following **Single Cover e-procurement procedure**, from Contractors registered in BWSSB or KPWD/KUWSDB for the **Work of Construction of Bridge near Strom Water Drain at 5 MLD Kaggadasapura coming under EE(WWM-P)-K&T Valley division (2nd call)** [*as defined in these documents and referred to as "the works"*] detailed in the Table given in the Invitation for Tenders (IFT). The Tenderers may submit tenders for the works detailed in the table given in IFT.

2. Eligible Tenderers

2.1 Tenderers shall not be under a declaration of ineligibility for corrupt and Fraudulent practices issued by the Government of Karnataka

2.2 Tenders from Joint ventures are not acceptable.

3. Tender Capacity

[All Tenderers shall upload the requested information accurately to the e-procurement portal https://kppp.karnataka.gov.in and in sufficient detail as also the requested documents as stipulated in Section 3: Qualification information]

3.1 Eligible Tenderers will be qualified, if their available tender capacity is more than the total tender value. The available tender capacity will be calculated as under:

Assessed available tender capacity = (A*N*2.5 - B) > 11.42 Lakhs

Where,

A = Maximum value of civil engineering works executed in any one year during the last five years [*updated to Lakhs*] taking into account the completed as well as works in progress.

N = Number of years prescribed for completion of the works for which tenders are invited.

B = Value, at Lakhs, of existing commitments and on-going works to be completed during the next one year [*period of completion of the works for which Tenders are invited]**

Note: *The statements showing the value of existing commitments and on-going works as well as the stipulated period of completion remaining for each of the works listed should be countersigned by the Employer in charge, not below the rank of an Executive Engineer or equivalent.*

3.2 Even though the Tenderers meet the above criteria, they are subject to be disqualified if they have:

- made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements; and/or
- record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc.; and/or
- Participated in the previous Tender for the same work and had quoted unreasonably high tender prices and could not furnish rational justification.

B. Tender documents

4. Content of Tender documents

4.1 The set of tender documents shall have all the Sections given in Page 2:

4.2 The tender documents are available online on the website http://kppp.karnataka.gov.in. The tender documents can be **downloaded free of cost.**

5. Amendment of Tender documents

5.1 Before the deadline for submission of tenders, the Employer may modify the tender documents by issuing addenda/corrigendum which shall be posted on the e-procurement portal https://kppp.karnatka.gov.in and efforts would be made to send e-mail communications to all the registered tenderers.

5.2 Any addendum thus issued shall be part of the tender documents and shall be notified as addendum/corrigendum in the e-procurement portal, which shall be binding on all the prospective tenderers.

5.3 To give prospective Tenderers reasonable time in which to take an addendum into account in preparing their tenders, the Employer shall extend as necessary the deadline for submission of tenders, in accordance with Sub-Clause 16.2 below. This shall be notified in the e-procurement portal.

C. Preparation of Tenders

6. Documents comprising the Tender

6.1 The tender submitted in KPPP by the Tenderer shall contain the documents as follows:

(a) Scanned copies of Qualification Information as per formats given in Section 3;
(b) The form of Tender (in the format indicated in Section 4)
(c) Priced Bill of Quantities shall be quote in KPPP portal only.

& any other materials required be completing and submitting by Tenderers in accordance with these instructions. The documents listed under Sections 3, 4, 6 and 9 shall be filled in without exception.

7. Tender prices

7.1 The contract shall be for the whole works as described in Sub-Clause 1.1, based on the priced Bill of Quantities submitted by the Tenderer in online.

7.2 The bidder shall make online entries to fill in the unit rates in figures for all items of the Works described in the Bill of Quantities, the system will automatically convert the unit rates mentioned in figures to words and also calculate the amount of that item as well as the total bid value. Items for which no rate is entered by the bidder will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities.

7.3 All duties, taxes, and other levies payable by the contractor under the contract, or
for any other cause, shall be included in the rates, prices and total Tender Price submitted by the Tenderer.

7.4 The rates and prices quoted by the Tenderer shall be fixed for the duration of the contract and shall not be subject to adjustment on any account.

[The tenderer shall complete the Contractor's tender using the Form as given in Section 4. The completed Contractor's Tender shall be uploaded through the procurement portal]

8. Tender validity

8.1 Tenders shall remain valid for a period not less than ninety days after the deadline date for tender submission specified in Clause 12. A tender valid for a shorter period shall be rejected by the Employer as non-responsive.

8.2 In exceptional circumstances, prior to expiry of the original time limit, the Employer may request that the Tenderers may extend the period of validity for a specified additional period. The request and the Tenderers' responses shall be made in writing or by cable or e-mail. A Tenderer may refuse the request without forfeiting his earnest money deposit. A Tenderer agreeing to the request will not be required or permitted to modify his tender, but will be required to extend the validity of his earnest money deposit for a period of the extension, and in compliance with Clause 9 in all respects.

9. Tender Processing Fee and Earnest money deposit

9.1 The Tenderers are required to pay (in the method as detailed in ITT Clause 9) as a part of his tender, the requisite tender processing fee as per details available on the e-procurement portal. The tenderers shall also furnish, as part of his tender, earnest money deposit in the amount as shown in column 4 of

the Table of IFT for this particular work. This earnest money deposit amount should be made in full in the method as detailed in ITT Clause 9.2 The details of payment of tender processing fee and earnest money deposit shall be filled in the Form given in Section 4 and uploaded along with tender.

9.2 The tender processing fee and the tender security as specified in the Table of IFB shall be denominated in Indian Rupees and shall be paid in the e-procurement portal using any of the following payment modes:
-Credit Card
-Direct Debit
-National Electronic Funds Transfer (NEFT)(offline Payment)

9.3 The tenders of those tenderers who have not paid the tender processing fee as well as earnest money deposit as detailed in Clause 9.2 of the ITT will be rejected by the system and tenderers would not be able to submit their tenders. Any tender not accompanied by an acceptable earnest money deposit and not secured as indicated in Sub-Clauses 9.1 9.2 and 9.3 above shall be rejected by the Employer as non-responsive.

9.4 The earnest money deposit of unsuccessful Tenderers will be returned within 30 days of the end of the tender validity period specified in Sub-Clause 8.1.

9.5 The earnest money deposit of the successful Tenderer will be discharged when the Tenderer has signed the Agreement and furnished the required Performance Security.

9.6 The earnest money deposit may be forfeited:
(a) If the Tenderer withdraws the Tender after tender opening during the period of tender validity;
(b) If the Tenderer does not accept the correction of the Tender Price, pursuant to Clause 19; or
(c) In the case of a successful Tenderer, if the Tenderer fails within the specified time limit to
(i) Sign the Agreement; or
(ii) Furnish the required Security deposit

10. Format and signing of Tender

Tenderer shall submit the Bid electronically before the submission date and time published in e-procurement portal.

D. Submission of Tenders

11. Tendering through E-procurement system:

11.1 The Tenderer should submit the tenders through e-Procurement Porta. No other modes of submission are permitted. The tendering is through website https://kppp.karnataka.gov.in . Detailed guidelines for viewing of tenders and submission of online tenders are given in the website. The prospective tenderers can submit their tender online. However, the tenderers are required to have enrolment/registration in the

web site and should have valid Digital Signature Certificate (DSC). The DSC can be obtained from any authorized certifying agencies as given in the e-procurement portal. The tenderers should register in the web site https://kppp.karnataka.gov.in. After this, the tenderers can log in the site through the secured login.

11.2 **The tenderers are requested to go through the tender documents carefully and submit the required information and documents without exception to avoid risk of rejection of tenders.**

11.3 The tenders shall submit online all the requirements. All the documents are to be signed digitally by the tenderer. After electronic online tender submission, the system generates a unique tender reference number which is time stamped. This shall be treated as acknowledgement of tender submission.

12. Deadline for submission of the Tenders

12.1 Tenders must be submitted/uploaded no later than 17:30 hours on - -2024 ..... . [9] The KPPP platform will not accept the tenders after the stipulated date and time (as per the clock of the e-procurement platform)

12.2 The Employer may extend the deadline for submission of tenders by issuing an amendment in accordance with Clause 5, in which case all rights and obligations of the Employer and the Tenderers previously subject to the original deadline will then be subject to the new deadline. The amendment/notification shall be notified in the e-procurement platform.

13. Late Tenders

13.1 Tenders cannot be uploaded by the tenderers after the deadline for submission/uploading of tenders (as per the clock of the KPPP platform) prescribed by the Employer.

16. Modification and Withdrawal of Tenders

14.1 In the **"My Bids"** section of the e-procurement portal, the tenderers can view the status of their tenders and decrypt tender (i.e. in cases where the Tenderer has chosen to encrypt the tender using his own public key) for modification or withdrawal before the stipulated date and time for submission/ uploading.

14.2 Tenderers may cancel/modify their tenders before the deadline for submission of the tenders.

14.3 For modification of tenders, the tenderers need not make any additional payment towards the cost of tendering process. For tender modification and consequent re-submission, the tenderer

9

is required to cancel his bid submitted earlier (only the financial is cancelled. All the uploaded documents would be there). The last modified tender submitted by the tenderer within the tender submission time shall be considered as the tender. **For this purpose, modifications/withdrawal by other means will not be accepted**. In online system of tender submission, the modification/cancellations is allowed any number of times. The tenderers may cancel its bid by clicking on the cancel button in the MY Bids Section before the deadline for submission of tenders, however if the tender is cancelled and not resubmitted within the stipulated time on the last date of submission of tenders, it would deemed to be withdrawn.

14.4 No tender may be modified/ cancelled online after the deadline for submission of tenders.

14.5 Withdrawal or modification of a Tender between the deadline for submission of Tenders and the expiration of the original period of Tender validity specified in Clause 8.1 above or as extended pursuant to Clause 8.2 is not allowed in the e-procurement system. If the tenderer does the same through any other medium, then it may result in the forfeiture of the earnest money deposit pursuant to Clause 9.

E. Tender opening and evaluation

15. Tender Opening:

15.1 The Employer will open/unlock the tenders of all the Tenderers uploaded through e-procurement platform as specified above, including modifications made pursuant to Clause 14 online at 15:00. Hours on - -2024 in the presence of tenderers or their authorized representatives, who choose to be present at the stipulated place as notified in the procurement portal. In the event of the specified date of Tender opening being declared a holiday for the Employer, the Tenders will be opened at the appointed time and location on the next working day. The tenderers can also view the contents of tenders after the opening of the tenders. The tenderer’s representatives who are present shall produce authorization letter and shall sign evidencing their attendance

15.2 Deleted

15.3 The Tenderers names, the Tender prices, the total amount of each Tender, any discounts, Tender modifications and withdrawals, the presence or absence of Tender security, and such other details as the Employer may consider appropriate, will be announced by the Employer at the opening. No Tender shall be rejected at Tender opening except for the late Tenders pursuant to Clause 13. Tenders [*and modifications*] sent pursuant to Clause 14 that are not opened and read out at Tender opening will not be considered for further evaluation regardless of circumstances. Late and withdrawn Tenders will be returned un-opened to Tenderers.

15.4 The Employer shall prepare minutes of the Tender opening, including the

Information disclosed to those present in accordance with Sub-Clause 15.3.

16. Process to be confidential

16.1 Information relating to the examination, clarification, evaluation, and comparison of Tenders and recommendations for the award of a contract shall not be disclosed to Tenderers or any other persons not officially concerned with such process until the award to the successful Tenderer has been announced. Any effort by a Tenderer to influence the Employer's processing of Tenders or award decisions may result in the rejection of his Tender.

17 Clarification of Tenders

17.1 To assist in the examination, evaluation, and comparison of Tenders, the Employer may, at his discretion, ask any Tenderer for clarification of his Tender, including breakdowns of unit rates. The request for clarification and the response shall be in writing or by cable, but no change in the price or substance of the Tender shall be sought, offered, or permitted.

17.2 Subject to sub-clause 22.1, no Tenderer shall contact the Employer on any matter relating to its Tender from the time of the Tender opening to the time the contract is awarded. If the Tenderer wishes to bring additional information to the notice of the Employer, it should do so by uploading on the e-procurement portal.

17.3 Any effort by the Tenderer to influence the Employer in the Employer’s Tender evaluation, Tender comparison or contract award decisions may result in the rejection of the Tenderers’ Tender.

18. Examination of Tenders and determination of responsiveness

18.1 Prior to the detailed evaluation of Tenders, the Employer will determine whether each Tender; (a)meets the eligibility criteria defined in Clause 2; and; (b) has been properly signed (c)is accompanied by the required earnest money deposit and substantially responsive to the requirements of the Tender documents.

18.2 A substantially responsive Tender is one which conforms to all the terms, conditions, and specifications of the Tender documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works; (b) which limits in any substantial way, inconsistent with the Tender documents, the Employer's rights or the Tenderer's obligations under the Contract; or (c) whose rectification would

affect unfairly the competitive position of other Tenderers presenting substantially responsive Tenders.

18.3 If a Tender is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.

19. Correction of errors: Deleted

20. Evaluation and comparison of Tenders

20.1 The Employer will evaluate and compare only the Tenders determined to be substantially responsive in accordance with Clause 18.

20.2 In evaluating the Tenders, the Employer will determine for each Tender the evaluated Tender Price by adjusting the Tender Price as follows:

(a) Deleted

(b) Making appropriate adjustments to reflect discounts or other price modifications offered in accordance with Sub Clause 14.5.

20.3 The Employer reserves the right to accept or reject any variation, deviation, or alternative offer. Variations, deviations, and alternative offers and other factors which are in excess of the requirements of the Tender documents or otherwise result in unsolicited benefits for the Employer shall not be taken into account in Tender evaluation.

20.4 Deleted

20.5 If the tender of the successful tenderer is seriously unbalanced in relation to the Employer's estimate of the cost of the work to be performed under the contract, the Employer may require the Tenderer to produce detailed price analysis for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the Employer may require that the amount of the performance security set forth in Clause 24.1 be increased at the expense of the successful Tenderer to a level sufficient to protect the Employer against financial loss in the event of default of the successful under the contract.

F. Award of Contract

21. Award criteria

21.1 Subject to Clause 23, the Employer will award the Contract to the Tenderer whose Tender has been determined to be substantially responsive to the Tender documents and who has offered the lowest evaluated Tender Price, provided that such Tenderer has been determined to be (a) eligible in accordance with the provisions of Clause 2, and (b) qualified in accordance with the provisions of Clause 3.

22. Employer's right to accept any Tender and to reject any or all Tenders

22.1 Notwithstanding Clause 21, the Employer reserves the right to accept or reject any Tender, and to cancel the Tender process and reject all Tenders, at any time prior to the award of Contract, without thereby incurring any liability to the affected Tenderer or Tenderers or any obligation to inform the affected Tenderer or Tenderers of the grounds for the Employer's action.

23. Notification of award and signing of Agreement

23.1 The Tenderer whose Tender has been accepted will be notified of the award by the Employer prior to expiration of the Tender validity period by cable, telex, e-mail or facsimile confirmed by registered letter. This letter [*hereinafter and in the Conditions of Contract called the "Letter of Acceptance"]* will state the sum that the Employer will pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract [*hereinafter and in the Contract called the "Contract Price"].*

23.2 The notification of award will constitute the formation of the Contract, subject only to the furnishing of Security deposit in accordance with the provisions of Clause 24.

23.3 The Agreement will incorporate all agreements between the Employer and the successful Tenderer. It will be kept ready for signature of the successful Tenderer in the office of Employer within 30 days following the notification of award along with the Letter of Acceptance. Within 20 days of receipt, the successful Tenderer will sign the Agreement and deliver it to the Employer.

23.4 Upon the furnishing by the successful Tenderer of the Performance Security, the Employer will promptly notify the other Tenderers that their Tenders have been unsuccessful.

24. Security deposit

24.1 Within 20 days of receipt of the Letter of Acceptance, the successful Tenderer shall deliver to the Employer a Security deposit in any of the forms given below for an amount equivalent to 5% of the Contract price plus additional security for unbalanced tenders in accordance with Clause 20.5 of ITT and Clause 37 of the Conditions of Contract.:

- Cash or Banker’s cheque/Demand draft, /Pay Order in favour of Chairman, BWSSB, from a Nationalized / Scheduled Indian Bank Payable at Bangalore
- A bank guarantee from a Nationalized / Scheduled Indian Bank in the form given in Section 10; or
- Specified Small Savings Instruments pledged to BWSSB

24.2 The security deposit if furnished in cash or demand draft can, if requested, be converted to interest bearing securities at the cost of the contractor.

24.3 Failure of the successful Tenderer to comply with the requirements of Sub-Clause 24.1 shall constitute sufficient

grounds for cancellation of the award and forfeiture of the Earnest money deposit.

25. Corrupt or Fraudulent practices

25.1 The GOK requires that the Tenderers/Suppliers/Contractors, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, GOK :

(a) will reject a proposal for award if it determines that the Tenderer recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;

(b) will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded a GOK contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, a GOK contract.

25.2 Furthermore, Tenderers shall be aware of the provision stated in sub-clause 43.2 of the Conditions of Contract.

Executive Engineer
WWM-P-K&T Valley Division
BWSSB, Kapila Bhavana, 2nd Floor,11th main,
35th cross, 4th T block, Jayanagar,
Bangalore-560041.

SECTION 3: QUALIFICATION INFORMATION

TABLE OF FORMS:

- **FORM OF TENDER**
- **QUALIFICATION INFORMATION**

- **LETTER OF ACCEPTANCE**
- **NOTICE TO PROCEED WITH THE WORK**
- **AGREEMENT FORM.**

Form of Tender

Description of the Work of Construction Bridge near Strom Water Drain at 5 MLD Kaggadasapura coming under EE(WWM-P)-K&T Valley division 2ND Call.

Tender to : **Executive Engineer,** WWM-P-K&T Valley Division, BWSSB, Kapila Bhavana, 2nd Floor, 11th main, 35th cross, 4th T block, Jayanagar, Bangalore-560041.

GENTLEMEN,

We offer to execute the Works described above in accordance with the Conditions of Contract accompanying this Tender for the Contract Price as indicated in the Price ..... [*in figures*] (.....)[*in letters*].[12]

This Tender and your written acceptance of it shall constitute a binding contract between us. We understand that you are not bound to accept the lowest or any Tender you receive.

We undertake that, in competing for (and, if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in force in India namely "Prevention of Corruption Act 1988".

We hereby confirm that this Tender complies with the Tender validity and Earnest money deposit required by the Tender documents.

We attach herewith our current income-tax clearance certificate.

Yours faithfully,

Authorized Signature:

Name & Title of Signatory: _____
Name of Tenderer _____

Address: ----------

Note: This Form has to be duly completed, signed and uploaded on the KPPP portal.

Qualification Information

The Tenderer shall carefully fill in the herein required information completely and upload all the documents as requested in complete form. The information to be filled in by

[12]To be filled in by the Tenderer, together with his particulars and date of submission at the bottom of the Form of Tender

the Tenderer hereunder will be used for purposes of determining the Tenderer's eligibility to tender, to determine his capacity to perform the contract as provided for in Clause 3 of the Instructions to Tenderers. Incomplete and insufficient furnishing of information and not uploading the requested documents may result in rejection of the Tender. This information will not be incorporated in the Contract.

1.1 Constitution or legal status of Tenderer [*Attach copy*]

Place of Registration

_____

[*Attach copy*]

Principal place of business:

_____

1.2 Total value of civil engineering construction works executed and payments received in the last five years (in Rs. Lakhs)[14]

2020 - 21[13] _____

2021 – 22 _____

2022 – 23 _____

2023 – 24 _____

2024 – 25 _____

P & L certified by the Chartered accountant

1.3 Information on works for which Tenders have been submitted and works which are yet to be completed as on the date of this Tender.

(A) Existing commitments and on-going works: (Mandatory)

Description of Work	Place& State	Contract No. & Date	Name and Address of Employer	Value of Contract (Rs. lakhs)	Stipulated period of completion	Value of works[15] remaining to be completed (Rs. lakhs)	Anticipated date of completion
1	2	3	4	5	6	7	8

(A) Works for which Tenders already submitted: (Mandatory)

Description of Work	Place & State	Name and Address of Employer	Estimated value of works (Rs. lakhs)	Stipulated Date period of completion	when decision is expected	Remarks if any
1	2	3	4	5	6	7

1

1

1

1.4. Name, address, and telephone, telex, and fax numbers of the Tenderers' bankers who may provide references if contacted by the Employer

NOTE: The following Forms mentioned below are for the information of the Tenderer. It is <u>not</u> to be completed and uploaded by the Tenderer on the KPPP portal

Letter of Acceptance

(letter head paper of the Employer)

_____[*date*]

To: _____[*name and address of the Contractor*]

Dear Sirs,

This is to notify you that your Tender dated _____ for execution of the _____ _____ [*name of the contract and identification number, as given in the Instructions to Tenderers*] for the Contract Price of Rupees —— _____ (_____) [*amount in words and figures*], as corrected and modified in accordance with the Instructions to Tenderers is hereby accepted by our Agency.

You are hereby requested to furnish Security deposit in the form detailed in Clause 24.1 of ITT for an amount of Rs.—————— valid up to 30 days from the date of expiry of Defects Liability Period and additional security for unbalanced tenders in terms of Clause 20.5 of ITT for an amount of Rs.—————— valid until 30 days from the date of issue of 'Certificate of completion' of the above work within 20 days of the receipt of this letter of acceptance, i.e. up to ..... and sign the contract, failing which action as stated in Para 24.3 of ITT will be taken.

Yours faithfully,

Authorized Signature
Name and Title of Signatory
Name of Agency

Issue of Notice to proceed with the work

(letterhead of the Employer)

—————— (*date)*

To
—————————————— [*name and address of the Contractor*]
Dear Sirs:

Pursuant to your furnishing the requisite security deposit as stipulated in ITT Clause 24.1 and signing of the contract agreement for the construction of ..... [16]a Tender Price of Rs.———————, you are

---

1

hereby instructed to proceed with the execution of the said works in accordance with the contract documents.

Yours faithfully,
(Signature, name and title of signatory authorized to sign on behalf of Employer)

Agreement Form

Agreement

This agreement, made the _____day of _____20_____, between_____ _____[*name and address of Employer*] [*hereinafter called **"the Employer"**]* of the one part and _____ _____ __ _____[*name and address of contractor] [hereinafter called "the Contractor"]* of the other part.

Whereas the Employer is desirous that the Contractor execute _____ _____ _____ _____[*name and identification number of Contract*] [*hereinafter called "the Works*"] and the Employer has accepted the Tender by the Contractor for the execution and completion of such Works and the remedying of any defects therein at a contract price of Rupees.....

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expression shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to, and they shall be deemed to form and be read and construed as part of this Agreement.
2. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all aspects with the provisions of the Contract.
3. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying the defects wherein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.
4. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz:
   i) Letter of Acceptance;
   ii) Notice to proceed with the works;
   iii) Contractor's Tender;
   iv) Contract Data;
   v) Conditions of contract (including Special Conditions of Contract);
   vi) Specifications;

_____

vii) Drawings;
viii) Bill of Quantities; and
ix) Any other document listed in the Contract Data as forming part of the contract.
x) Jurisdiction of Courts/Arbitration:

The sitting of arbitration shall be held at Bangalore only and nowhere else.

xi) Dispute of any kind arising out of the contract shall be resolved within the jurisdiction of Bangalore City only and the parties agree and clearly understand that the courts/tribunals situated at Bangalore Metropolitan City have exclusive jurisdiction for the redressal of the disputes arising out of the contract and no other place.

xii) The parties further agree and understand that the place or places of issue of bank guarantee other than Bangalore will have no jurisdiction to resolve dispute of any kind relating to enforcement of the bank guarantees submitted by the contractor at Bangalore for the execution of the contract at Bangalore.

xiii) The contractor shall comply with all the legal requirement in the matter of employment of workmen and provide all safety gadgets to the workmen while working in the hazards place or conditions during the execution of the contract.

xiv) Contractor shall be fully responsible in the event of death of employee/workman during the execution of the work and liable to pay adequate compensation to the dependants of employee/workman as per law.

xv) On his/their failure, if the Board is made to pay compensation the same shall be recovered by the Board from the contractor out of the amounts due to the contractor or by appropriate legal action.

xvi) If death of any employees occurs during execution of work due to negligence of contractor, the contract will be liable for termination.

xvii) In the event of such termination, the employer may consider blacklisting of firm after due notice.

xviii) In case of any death or accident the contactor will be cancelled after following due process.

xix) The Board will be entitled to claim exemplary damaged from the contractor in case of death of any work man/employees of the Contractor in any of the BWSSB works as it damages the reputation of the Board.

In witness whereof the parties thereto have caused this Agreement to be executed the day and year first before written.
The Common Seal of

_____
was hereunto affixed in the presence of:
Signed, Sealed and Delivered by the said

_____

_____
in the presence of:
Binding Signature of Employer _____

Binding Signature of Contractor

_____

Executive Engineer
South-2 Water Supply & Sanitary Division
BWSSB, Kapila Bhavana, 11th main,
35th cross, 4th T block, Jayanagar,
Bangalore-560041.

SECTION 4: CONDITIONS OF CONTRACT

Table of Contents

A.	**General**	**Page No.**
1.	Definitions	21
2.	Interpretation	21
3.	Law governing contract	22
4.	Employers decisions	22
5.	Delegation	22
6.	Communications	22
7.	Subcontracting	22
8.	Other Contractors	22
9.	Personnel	22
10.	Employer's and Contractor's risks	22
11.	Employer's risks	22
12	Contractor's risks	23
13	Query about Contract Data	23
14	Contractor to construct the Works	23
15.	The Works to be completed by Intended Completion Date	23
16	Safety	24
17.	Discoveries	24
18.	Possession of the Site	24
19.	Access to the Site	24
20.	Instructions	24
B.	**Time Control**	
21.	Program	24
22.	Extension of the Intended Completion Date	25
23.	Delays ordered by the Employer	25
24.	Management meetings	25
C.	**Quality Control**	
25.	Identifying defects	25

26. Tests 25
27. Correction of defects 25
28. Uncorrected defects 25
D. Cost Control
29 Bill of Quantities (BOQ) 26
30 Variations 26
31. Payment for Variations 26
32. Submission of bills for payment 27
33 Payments 27
34. Compensation events 27
35. Tax 27
36. Liquidated damages 28
37. Cost of repairs 29
E Finishing of Contract
38. Completion 29
39. Taking Over 29
40. Final account 29
41. As built drawings and/or Operating and Maintenance Manuals 29
42. Termination 29
43 Payment upon termination 30
44. Property 30
45. Release from performance 30

F Special Conditions of Contract 31

Conditions of Contract
A. General

1. Definitions

1.1 Terms which are defined in the Contract Data are not also defined in the Conditions of Contract but keep their defined meanings. Bold letters are used to identify defined terms.

Bill of Quantities means the priced and completed Bill of Quantities forming part of the Tender.

Compensation events are those defined in Clause 38 hereunder.

The **Completion Date** is the date of completion of the Works as certified by the Employer in accordance with Sub Clause 46.1.

The **Contract** is the contract between the Employer and the Contractor to execute, complete and maintain the Works. It consists of the documents listed in Clause 2.2 below.

The **Contract Data** defines the documents and other information which comprise the Contract.

The **Contractor** is a person or corporate body whose Tender to carry out the Works has been accepted by the Employer.

The **Contractor's Tender** is the completed Tender document submitted by the Contractor to the Employer.

The **Contract price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

Days are calendar days; months are calendar months.

A **Defect** is any part of the Works not completed in accordance with the Contract.

The **Defects liability period** is the period named in the Contract Data and calculated from the Completion Date.

The **Employer** is the party who will employ the Contractor to carry out the Works.

Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.

The **Initial Contract price** is the Contract Price listed in the Employer's Letter of Acceptance.

The **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Employer by issuing an extension of time.

Materials are all supplies, including consumables, used by the contractor for incorporation in the Works.

Plant is any integral part of the Works which is to have a mechanical, electrical, electronic or chemical or biological function.

The **Site** is the area defined as such in the Contract Data.

Specification means the Specification of the Works included in the Contract and any modification or addition made or approved by the Employer.

The **Start Date** is given in the Contract Data. It is the date when the Contractor shall commence execution of the works. It does not necessarily coincide with any of the Site Possession Dates.

A **Subcontractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract which includes work on the Site.

A **Variation** is an instruction given by the Employer which varies the Works.

The **Works** are what the Contract requires the Contractor to construct, install, and turn over to the Employer, as defined in the Contract Data.

2. Interpretation

2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Employer will provide instructions clarifying queries about the Conditions of Contract.

2.2 The documents forming the Contract shall be interpreted in the following order of priority:

(1) Agreement
(2) Letter of Acceptance, notice to proceed with the works
(3) Contractor’s Tender
(4) Contract Data
(5) Conditions of Contract
(6) Specifications
(7) Drawings
(8) Bill of quantities and
(9) Any other document listed in the Contract Data as forming part of the Contract.

3. Law governing contract

3.1 The law governing the Contract is the Laws of India supplanted by the Karnataka Local Acts.

4. Employer's decisions

4.1 Except where otherwise specifically stated, the Employer will decide contractual matters between the Employer and the Contractor.

5. Delegation

5.1 The Employer may delegate any of his duties and responsibilities to other people after notifying the Contractor and may cancel any delegation after notifying the Contractor.

6. Communications

6.1 Communications between parties which are referred to in the conditions are effective only when in writing. A notice shall be effective only when it is delivered (in terms of Indian Contract Act).

7. Subcontracting

7.1 The Contractor may subcontract with the approval of the Employer but may not assign the Contract without the approval of the Employer in writing. Subcontracting does not alter the Contractor's obligations

8. Other Contractors

8.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer.

9. Personnel

9.1 The Contractor shall employ the technical personnel [*of number and qualifications]* as may be stipulated by GOK from time to time during the execution of the work. The technical staff so employed shall be available at site as may be stipulated by the Employer.

9.2 If the Employer asks the Contractor to remove a person who is a member of the Contractor’s staff or his work force stating the reasons, the Contractor shall ensure that the person leaves the Site

within seven days and has no further connection with the work in the Contract.

10. Employer’s and Contractor's risks

10.1 The Employer carries the risks which this Contract states are Employer’s risks, and the Contractor carries the risks which this Contract states are Contractor’s risks.

11. Employer's risks

11.1 The Employer is responsible for the expected risks which are (a) in so far as rebellion, riot commotion or disorder or (b) a cause due solely to the design of the works, other than the Contractor’s design.

12. Contractor’s risks

12.1 All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks are the responsibility of the Contractor.

13. Queries about the Contract Data

13.1 The Employer will clarify queries on the Contract Data.

14. Contractor to construct the Works

14.1 The Contractor shall construct the Works in accordance with the Specification and Drawings.

15. The Works to be completed by the Intended Completion Date

15.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the program submitted by the Contractor, as updated with the approval of the Employer, and complete them by the Intended Completion Date.

16. Safety

16.1 The Contractor shall be responsible for the safety of all activities on the Site.

17. Discoveries

17.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site is the property of the Employer. The Contractor is to notify the Employer of such discoveries and carry out the Employer's instructions for dealing with them.

18. Possession of the Site

18.1 The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the Contract Data the Employer is deemed to have delayed the start of the relevant activities and this will be Compensation Event.

19. Access to the Site

19.1 The Contractor shall allow the Employer and any person authorized by the Employer access to the Site, to any place where work in connection with the Contract is being carried out or is intended to be carried out and to any place where materials or plant are being manufactured / fabricated / assembled for the works.

20. Instructions

20.1 The Contractor shall carry out all instructions of the Employer which comply with the applicable laws where the Site is located.

B. Time Control

21. Program

21.1 Within the time stated in the Contract Data the Contractor shall submit to the Employer for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the Works.

21.2 The Employer's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Employer again at any time. A revised Program is to show the effect of Variations and Compensation Events.

22. Extension of the Intended Completion Date

22.1 The Employer shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date.

22.2 The Employer shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Employer for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information.

23. Delays ordered by the Employer

23.1 The Employer may instruct the Contractor to delay the start or progress of any activity within the Works.

24. Management meetings

24.1 The Employer may require the Contractor to attend a management meeting. The business of a management meeting shall be to review the progress achieved and the plans for remaining work.

24.2 The responsibility of the parties for actions to be taken is to be decided by the Employer either at the management meeting or after the management meeting and stated in writing to be distributed to all who attended the meeting.

C. Quality Control

25. Identifying defects

25.1 The Employer shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Employer may instruct the Contractor to search for a Defect and to uncover and test any work that the Employer considers may have a Defect

26. Tests

26.1 If the Employer instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect the test shall be a Compensation Event.

27. Correction of defects

27.1 The Employer shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion and is defined in the Contract Data. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

27.2 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Employer’s notice.

28. Uncorrected defects

28.1 If the Contractor has not corrected a Defect within the time specified in the Employer’s notice, the Employer will assess the cost of having the Defect corrected, and the Contractor will pay this amount.

2 D. Cost Control

29. Bill of Quantities (BOQ)

29.1 The BOQ shall contain items for the construction, installation, testing, and commissioning work to be done by the Contractor.

29.2 The BOQ is used to calculate the Contract Price. The Contractor is paid for the quantity of the work done at the rate in the BOQ for each item

30. Variations

30.1 The Employer shall have power to order the Contractor to do any or all of the following as considered necessary or advisable during the progress of the work by him

(a) Increase or decrease of any item of work included in the Bill of Quantities (BOQ);
(b) Omit any item of work;
(c) Change the character or quality or kind of any item of work;
(d) Change the levels, lines, positions and dimensions of any part of the work;
(e) Execute additional items of work of any kind necessary for the completion of the works; and
(f) Change in any specified sequence, methods or timing of construction of any part of the work.

30.2 The Contractor shall be bound to carry out the work in accordance with any instructions in this connection, which may be given to him in writing by the Employer and such alteration shall not vitiate or invalidate the contract.

30.3 Variations shall not be made by the Contractor without an order in writing by the Employer, provided that no order in writing shall be required for increase or decrease in the quantity of an item appearing in the BOQ so long as the work executed conforms to the approved drawings.

30.4 The Contractor shall promptly request in writing the Employer to confirm verbal orders and if no such confirmation is received within 15 days of request, it shall be deemed to be an order in writing by the Employer

31. Payments for Variations

31.1 Payment for increase in the quantities of an item in the BOQ up to 25% of that provided in the Bill of Quantities shall be made at the rates quoted by the Contractor.

31.2 For quantities in excess of 125% of the tendered quantity of an item as given in the BOQ, the Contractor shall be paid at the rate entered in or derived from in the Schedule of Rates (applicable for the area of the work and current at the time of award of contract) plus or minus the overall percentage of the original tendered rates over the current Schedule of Rates prevalent at the time of award of contract.

31.3 If there is no rate for the additional, substituted or altered item of the work in the BOQ, efforts would be made to derive the rates from those given in the BOQ or the Schedule of Rates (applicable for the area of the work and current at the time of award of contract) and if found feasible the payment would be made at the derived rate for the item plus or minus the overall percentage of the original tendered rates over the current Schedule of Rates prevalent at the time of award of contract

31.4 If the rates for additional, substituted or altered item of work cannot be determined either as at 35.1 or 35.2 or 35.3 above, the Contractor shall be requested to submit his quotation for the items supported by analysis of the rate or rates claimed, within 7 days.

31.5 If the Contractor's quotation is determined unreasonable, the Employer may order the Variation and make a change to the Contract Price which shall be based on Employer’s own forecast of the effects of the Variation on the Contractor's costs.

31.6 If the Employer decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.

31.7 Under no circumstances the Contractor shall suspend the work on the plea of non-settlement of rates for items falling under this Clause.

32. Submission of bills for payment

32.1 The Contractor shall submit to the Employer monthly bills of the value of the work completed less the cumulative amount paid previously.

32.2 The Employer shall check the Contractor's bill and determine the value of the work executed which shall comprise of (i) value of the quantities of the items in the BOQ completed and (ii) valuation of Variations and Compensation Events.

32.3 The Employer may exclude any item paid in a previous bill or reduce the proportion of any item previously paid in the light of later information.

33. Payments

33.1 Payments shall be adjusted for deductions for advance payments, other recoveries in terms of the contract and taxes, at source, as applicable under the law. The Employer shall pay the Contractor the within 60 days of submission of bill. The Contractor shall be liable to pay liquidated damages for shortfall in progress. For Progress beyond the agreed programme, payment is subject to availability of the grants.

33.2 Items of the Works for which no rate or price has been entered in will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

34. Compensation events

34.1 The following are Compensation events unless they are caused by the Contractor:

(a) The Employer does not give access to a part of the Site by the Site Possession Date stated in the Contract Data.
(b) The Employer orders a delay or does not issue drawings, specifications or instructions required for execution of works on time.
(c) The Employer instructs the Contractor to uncover or to carry out additional tests upon work which is then found to have no Defects.
(d) The Employer gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.
(e) The effect on the Contractor of any of the Employer’s Risks.
(f) The Employer unreasonably delays issuing a Certificate of Completion.

(g) Other Compensation Events listed in the Contract Data or mentioned in the Contract.

34.2 If a Compensation Event would cause additional cost or would prevent the work being completed before the Intended Completion Date, the Contract Price shall be increased and/or the Intended Completion Date is extended. The Employer shall decide whether and by how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.

34.3 As soon as information demonstrating the effect of each Compensation event upon the Contractor's forecast cost has been provided by the Contractor, it is to be assessed by the Employer and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Employer shall adjust the Contract Price based on Employer’s own forecast. The Employer will assume that the Contractor will react competently and promptly to the event.

34.4 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor not having given early warning or not having cooperated with the Employer.

35. Tax

35.1 The rates quoted by the Contractor shall be deemed to be inclusive of the sales and other taxes that the Contractor will have to pay for the performance of this Contract. The Employer will perform such duties in regard to the deduction of such taxes at source as per applicable law.

36. Liquidated damages

36.1 The Contractor shall pay liquidated damages to the Employer at the rate per day stated in the Contract Data for each day that the Completion Date is later than the Intended Completion Date (for the whole of the works or the milestone as stated in the Contract Data). The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages does not affect the Contractor's liabilities.

36.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Employer shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment of bill.

37. Cost of Repairs:

37.1 Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.

E. Finishing the Contract

38. Completion

38.1 The Contractor shall request the Employer to issue a Certificate of Completion of the Works and the Employer will do so upon deciding that the Work is completed.

39. Taking over

39.1 The Employer shall take over the Site and the Works within seven days of issuing a certificate of Completion.

40. Final account

40.1 The Contractor shall supply to the Employer a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Employer shall issue a Defect Liability Certificate and certify any final payment that is due to the Contractor within 90 days of receiving the Contractor's account if it is correct and complete. If it is not, the Employer shall issue within 90 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Employer shall decide on the amount payable to the Contractor and make payment within 60 days of receiving the Contractor’s revised account.

41. As built drawings and /or Operating and Maintenance Manuals

41.1 If “as built”[1] Drawings[17] and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the Contract Data.

41.2 If the Contractor does not supply the Drawings by the dates stated in the Contract Data, or they do not receive the Employer’s approval, the Employer shall withhold the amount stated in the Contract Data from payments due to the Contractor.

42. Termination

42.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract.

42.2 Fundamental breaches of Contract include, but shall not be limited to the following:

(a) The Contractor stops work for 45 days when no stoppage of work is shown on
the current Program and the stoppage has not been authorized by the Employer;

(b) The Employer instructs the Contractor to delay the progress of the Works and
the instruction is not withdrawn within 60 days;

(c) The Contractor becomes bankrupt or goes into liquidation other than for a
reconstruction or amalgamation;

(d) A payment due to the Contractor is not paid by the Employer within 90 days of

1

1

the date of the submission of the Bill by Contractor;

(e) The Employer gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Employer;

(f) The Contractor does not maintain a security which is required;

(g) The Contractor has delayed the completion of works by the number of days for which the maximum amount of liquidated damages can be paid as defined in the Contract data; and

(h) If the Contractor, in the judgment of the Employer has engaged in corrupt or fraudulent practices in competing for or in the executing the Contract.

For the purpose of this paragraph: "corrupt practice" means the offering, giving, receiving or soliciting of any thing of value to influence the action of a public official in the procurement process or in contract execution. "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Borrower, and includes collusive practice among Tenderers (prior to or after Tender submission) designed to establish Tender prices at artificial non-competitive levels and to deprive the Borrower of the benefits of free and open competition."

42.3 When either party to the Contract gives notice of a breach of contract to the Employer for a cause other than those listed under Sub Clause 49.2 above, the Employer shall decide whether the breach is fundamental or not.

42.4 Notwithstanding the above, the Employer may terminate the Contract for convenience.

42.5 If the Contract is terminated the Contractor shall stop work immediately, make the Site safe and secure and leave the Site as soon as reasonably possible.

43. Payment upon Termination

43.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Employer shall prepare bill for the value of the work done less advance payments received up to the date of the bill, less other recoveries due in terms of the contract, less taxes due to be deducted at source as per applicable law and less the percentage to apply to the work not completed as indicated in the Contract Data. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor the difference shall be a debt payable to the Employer.

43.2 If the Contract is terminated at the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Employer shall prepare bill for the value of the work done, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works and less advance payments received up to the date of the certificate, less

other recoveries due in terms of the contract, and less taxes due to be deducted at source as per applicable law and make payment accordingly.

44. Property

44.1 All materials on the Site, Plant, Equipment, Temporary Works and Works are deemed to be the property of the Employer, if the Contract is terminated because of a Contractor's default.

45. Release from performance

45.1 If the Contract is frustrated by any event entirely outside the control of either the Employer or the Contractor the Employer shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which commitment was made

F. Special Conditions of Contract

1. Labour :

The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport.

The Contractor shall, if required by the Employer, deliver to the Employer a return in detail, in such form and at such intervals as the Employer may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such other information as the Employer may require.

2. Compliance with labour regulations:

During continuance of the contract, the Contractor and his sub contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, Employer shall have the right to deduct any money due to the Contractor including his amount of security deposit. The Employer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer.

The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point of time.

3. Protection of Environment:

The contractor shall take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation. During continuance of the contract, the contractor and his sub-contractors shall abide at all times by all existing enactments on environmental protection and rules made there under, regulations, notifications and bye-laws of the State or Central Government, or local authorities and any other law, bye-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority.

4. The contractor should utilize treated water from the STPs for the purpose of road restoration while compacting the earth.

SECTION 5: CONTRACT DATA

Items marked "N/A" do not apply in this Contract.

The following documents are also part of the Contract:
Clause Reference

The Employer is : Executive Engineer

Name: Mr. Raghavendra C R.
[1.1]

Address: **Executive Engineer,** WWM-P-K&T Valley Division BWSSB, Kapila Bhavana, 2nd Floor 11th main, 35th cross, 4th T block, Jayanagar, Bangalore-560041.

.

Name of authorized Representative: Mr.Raghu.R
The name and identification number of the contract is Mob: 9845444084
[1.1]
BWSSB /EEWWM-P-K&T Valley/TO/PB/ /2024-25 Dt:

Work of Construction of Bridge near Strom Water Drain at 5 MLD STP Kaggadasapura coming under EE(WWM-P)-K&T Valley division 2nd call.

The start date shall be the date of issue of notice to proceed with the work.
[1.1]

The Intended Completion Date for the whole
of the Works is 3 months from the date of commencement of the Work [2]
[15, 22]

The following documents also form part of the Contract: [2.2]

_____
_____

The Site Possession Date is:
[18]

The alignment is located **at 5 MLD STP Kaggadasapura**
[1.1]
and is defined in drawings nos. _____
_____
The Defects Liability Period is 365 days.
[27]
The liquidated damages for the whole of the works are Rs.0.1% per day on the value of the work (amount) per day[3]
[36]

The maximum amount of liquidated damages for the whole of the works [36]
is ten percent of final contract price.
The date by which "as-built"[4] drawings (in scale …) in 2 sets are required is within 30 days of issue of certificate of completion.
[41]

The amount to be withheld for failing to supply "as built"[5] drawings by the date required is Rs._____
[41]

The following events shall also be fundamental breach of the contract :
[42.2]
1. The contractor has contravened Sub-clause 7.1 and Clause 9 of CC.

The percentage to apply to the value of the work not completed representing the Employer's additional cost for completing the Works shall be 30 percent. [43.1]

Executive Engineer
WWM-P-K&T Valley Division
BWSSB, Kapila Bhavana, 2nd Floor,
11th main,
35th cross, 4th T
block, Jayanagar,
Bangalore-
560041.

2
3
4
5

SECTION 6 : SPECIFICATIONS

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS FOR CIVIL WORKS.

GENERAL INFORMATION

A. GENERAL: The work under this tender shall be executed strictly in accordance with constructional and material requirements defined under these specifications. The Contractor shall carefully acquaint himself with these specifications to determine his contractual obligations for the work. The conditions of these specifications will be binding on the Contractor and no deviation shall be permissible unless specifically approved by the Consultant / Project-in-charge in writing. In absence of any detailed Specifications these specification, latest Indian Standard specifications and code of practice shall become applicable. Wherever the codes and specifications are silent then the same shall be governed by sound engineering practices and the decision of the Project-in-charge / consultant in matters of interpretation etc., shall be final and binding on the Contractor.

B. DRAWINGS / DIMENSIONS: Figured dimensions on drawings shall supersede measurements by scale and drawings to a large scale take precedence over those to a smaller scale. Special dimensions or directions in the specifications shall be checked on site. Measurements and other information concerning the existing site on the drawings are believed to be correct, but the Contractor shall verify them for himself and also examine the nature of the ground as no claim or allowance whatsoever shall be entertained hereinafter on account of any errors or omissions in the levels or the description of the ground turning out to be different from what was expected or shown on the drawings.

C. CORRELATION OF DRAWING: Before commencement of work, the Contractor shall correlate all relevant structural, Construction and services drawings and satisfy himself that the information available is complete and unambiguous. The Contractor shall be responsible for any error / difficulty in execution / damage incurred owing to any discrepancy in the drawings which has been overlooked by him and has not been brought to the notice of the Project-in-charge / Consultant before execution.

D. B.I.S CODES OF PRACTICE: Wherever any reference is made in the specifications to any bureau of Indian Standard (IS) code of practice, it shall be understood to indicate the latest version of the code of practice in usage at the time of construction. E. ALL SIMILAR RATES TO HAVE SAME QUOTED RATE It shall be noted by the bidder that a similar item repeated at various sub heads of the tender, he should quote same rates. For any reasons different rates are quoted the lowest rate shall be considered for deriving the substituted / extra item rate if required.

SPECIFICATIONS

1. SPECIFICATIONS FOR EXCAVATION AND EARTHWORK.

1.1 SCOPE The scope of work broadly includes but is not necessarily limited to the following i.e. clearing of the site, excavation of foundation trenches, back-filling, disposal of surplus earth as required

including dewatering, shoring and strutting. Contractor shall provide all tools, labour, equipment and incidentals necessary, required for completion of all aspects of work covered in these specifications.

1.2 TYPES OF SOIL Contractor shall thoroughly acquaint himself with the types of soil in excavation by an inspection of nature of the ground at site & scrutiny of the investigation details available with the Consultant.

1.3 CLEARING THE SITE The site on which the structure is to be built shown on the drawing and the area required for setting out and other operations like road, drains, sheds, etc. should be cleared and all obstructions, loose stones, materials, and rubbish of all kinds, stump, brush wood and trees removed as directed, roots being entirely grubbed up. All useful materials obtained will be the property of the Project-in-charges and will be handed over to the Consultant. Rejected materials will be removed by the contractor to his own dump.

1.4 GROUND LEVELS AND SITE LEVEL PLAN Before starting the excavations, the requisite block levels of the entire plot shall be taken by the contractor in consultation with the Consultant and a proper record of these levels to be kept, which shall be jointly signed by the Contractor and the Consultant. A block level plan showing-all the ground levels of the plot shall be prepared and shall jointly be signed by the Contractor and the Consultant/Project-in-charge.

1.5 SETTING OUT After clearing the site, and preparing the site level plan, the Contractor will set out the center lines of the building or other involved works and get the same approved from the Consultant. It shall be the responsibility of the Contractor to install substantial reference marks; bench marks etc. and maintain them as long as required by the Consultant. The Contractor will assume full responsibility for proper setting out, alignment, elevation and dimension of each and all parts of the work.

1.6 EXCAVATION AND PREPARATION OF FOUNDATIONS FOR CONCRETING

1.6.1 General Foundation trenches shall be dug wet or dry to the dimensions as shown on the drawings or as directed by the Consultant. The excavated materials shall be stacked at a sufficient distance away from the edge of the excavated pit so as not to endanger the stability of the sides. The soil heap shall not exceed more than 2 m from the ground. The contractor shall, at his expense and without any extra charge, make provision for all shoring and strutting, extra excavation in slope, extra excavation in working space, dredging or bailing out water, and the excavation shall be kept free from water when the foundation work is in progress. If excavation is carried out to greater width, length or depth than specified, extra depth shall be made up by filling in lean concrete and extra length or width by filling in with earth rammed hard or by masonry as shall be borne in full by the contractor. If required to protect the sides of pits and trenches, timber shoring and strutting shall be erected. The timbering shall be closed or open depending on the nature of the soil and work, and arrangement of timbering including sizes and spacing of members used shall be as approved by the Consultant. NO extra charges shall be admissible on this account. The bottoms of all excavation shall be trimmed and leveled in accordance with drawings / directions of the Consultant / Project-in-charge. The bottoms of all excavation shall be rammed and wetted before deposition of concrete. The contractors shall report to the Consultant / Project-in-charge when the excavation is ready to receive concrete. NO concrete shall be placed in foundations until the contractor has obtained the approval of Consultant / Project-in-charge.

1.6.2 PROTECTION All foundation trenches and similar excavations shall be strong, fenced and marked with red lights at night for watchmen to avoid accidents. Adequate protective measures shall be taken to see that the excavation does not affect or damage adjoining structures. All measures required for the safety of the excavation, the people working in and near the foundation trenches, property and the people in the vicinity shall be taken care by the Contractor at his own cost, being entirely responsible for any injury and damage to property caused by his negligence or accident due to his construction operations.

1.6.3 STACKING OF EXCAVATED MATERIALS: Work for excavation shall include sorting out of useful materials and stacking them on site as directed. Materials suitable and useful for back-filling, plinth, filling, leveling of the plot or other use shall be stacked at convenient places, but not in such a way as to obstruct free movement of men, equipment and vehicles or encroach on the area required for constructional purposes.

1.7 BACKFILLING

1.7.1 Earth obtained from excavation (or approved earth brought from outside for which no extra payment shall be made) shall be filled in layers as described in

1.7.2 QUALITY OF FILL Fill shall be of well compacted, well graded earth or sand and shall be free from tree stumps, organic matter, seed and peat etc. Where earth or sand from source other than excavation at site is used, the quality of such earth or sand shall be the same as that obtained from excavation at site, or superior to it. Fine sand for filling is River Sand. Black cotton soil shall not be used for back filling or plinth filling.

1.7.3 COMPACTION The fill shall be spread in layers not exceeding 20 cm thick and each layer shall be watered and thoroughly consolidated by suitable mechanical rollers, rammers, vibrators or other approved plant or system of compaction. The fill material shall be pulverized before depositing in place. An optimum moisture content shall be maintained for the filled materials. Compaction shall be done so as to achieve a dry density of not less than 90% of the maximum density obtained at optimum moisture content, except for the upper 20 cm layer which shall be compacted to a density of not less than 95% of the maximum density. In order that the fill shall be reasonably uniform throughout, the material shall be dumped in place in approximately horizontal layers “Edge dumping”, a process by which the materials is pushed off edge of the fill and allowed to roll down the slope shall not be carried out. If there is traffic over the fill during construction, either by construction equipment or otherwise, it should be routed to make the compaction as uniform load shall be maintained and also care shall be taken to prevent any wedging action.

1.8 SURPLUS EXCAVATED MATERIAL All excavated material certified as surplus and not useful, shall be removed by the Contractor from the site in an approved manner at his own cost and risk so as indemnify owner from any claims any time of whatsoever nature.

1. SPECIFICATIONS FOR ANTI-TERMITE TREATMENT

2.1 GENERAL Prevention of termite from reaching the super structure can be achieved by creating a chemical barrier between the ground and the building by treating the soil beneath the building and around the foundations. The work shall be carried out as per IS 6313 part II. of 2001 or the latest edition. This shall be provided to sides and bottom of trenches and footings including treating the

backfill of foundations up to ground level and the vertical surface of wall, and filling of each under floors and treating the surface at ground level 900 mm around the building.

2.2 MATERIAL Anti termite treatment, shall be carried out strictly in accordance with CPWD specifications using Chlorpyrifos (CPP) an Emulsified concentrate @ 1% concentration or any other approved chemical.

2.3 PRE-CONSTRUCTION CHEMICAL TREATMENT This is a process in which chemical treatment is applied to a building in the early stages of its construction at the rate specified In IS 6313 part II of 2001 or the latest edition. Hand operated pressure pump shall be used for uniform spraying of the chemical. To have proper check for uniform spraying of chemical graduated containers shall be used. Proper check should be kept that specified quantity of chemical is used for the required areas during the operation.

2.4 TIME OF APPLICATION Soil treatment shall start when foundation trenches and pits are ready to take lean concrete in foundations. Laying of lean concrete shall start when chemical emulsion has been absorbed by the soil and the surface is quite dry. Treatment should not be carried out when it is raining or soil is wet with rain or sub soil water. The foregoing applies also in the case of treatment to the filled earth surface within the plinth before laying the sub grade for the floor.

2.5 DISTURBANCE The treated soil barriers shall not be disturbed after they are formed. If by chance, treated soil barriers are disturbed, immediate steps shall be taken to restore the continuity and completeness of the barrier system.

2.6 TREATMENT OF COLUMN PITS AND WALL TRENCHES

a) The bottom surface and the sides (up to a height of above 300 mm) of the excavation made for column pits and trenches shall be treated with the chemical at the rate specified in IS 6313 Part II of 2001 or the latest edition.

b) After the column foundation and the wall foundation come up, the back fill in immediate contact with the foundation structure shall be treated at the rate specified in IS 6313 Part II of 2001 or the latest edition of the vertical surface of the substructure for each side If water is used for ramming the earth fill, the chemical treatment shall be carried out after the ramming operation is done by prodding the earth at 150 mm centers close to the wall surface and spraying the chemical with the above dose. The earth is usually returned in layers and the treatment shall be carried out in similar stages. The chemical emulsion shall be directed towards the concrete to masonry surface of the columns and walls so that the earth in contact with these surfaces is well treated with the chemical.

c) In the case of R.C.C. framed structure with columns and plinth beams and R.C.C basement with concrete, mix is rich and dense (being 1:2:4 or richer), it is unnecessary to start the treatment from the bottom of excavation for columns and plinth beams. The treatment shall start at the depth of 500 mm below ground level. , From this depth the back-fill around the columns, beams and R.C.C. basement wall shall be treated at the rate as per IS 6313 Part II of 2001 or the latest edition. The other details of treatment shall be as laid down in the Clause (b) above.

2.7 TREATMENT OF TOP SURFACE OF PLINTH FILLING

The top surface of the filled earth within plinth wall shall be treated with chemical emulsion at the rate as per IS 6313 Part II 2001 or the latest direction (surface area) before the sand/sub -grade is laid. Holes up to 50 to70 mm deep at 150 mm centers both ways shall be made with crow bars on the surface to facilitate saturation of the soil with chemical emulsion.

2.8 TREATMENT OF JUNCTION OF WALL AND FLOOR To achieve continuity of the vertical chemical barrier on inner wall surface from the ground level, small channel 30 X 30 mm shall be made at all the junctions of wall and columns with the floor (before laying the sub-grade) and rod holes made in the channel up to ground level 150 mm apart and the chemical emulsion poured along the channel as per rate of application, mentioned in IS 6313 Part II (2001) or the latest edition so as to soak the soil right up to bottom. The soil shall be tamped back into place after this operation.

2.9 TREATEMENT OF SOIL ALONG EXTERNAL PERMIETER OF BUILDING During progress of work, provide hole in the soil with iron rods along the external perimeter of the building at intervals of about 150 mm and depth 300 mm and filling these holes with chemical emulsion at the rate (as per IS 6313 Part II of 2001 or the latest edition) per meter of perimeter of the external wall.

2.10 TREATMENT FOR EXPANSION JOINTS Anti termite treatment shall be supplemented by treating through the expansion joint after the sub grade has been laid as per IS 6313 Part II of 2001 or the latest edition.

2.11 TREATMENT OF SOIL SURROUNDING PIPES AND CONDUITS When pipes and conduits enter the soil inside the area of the foundations, the soil surrounding the points of entry shall be loosened around each such pipe, or conduit for a distance of 150 mm and up to depth of 75 mm before treatment is commenced When they enter the soil external to the foundations, they shall be similarly treated unless they stand clear of the walls of the building by about 75 mm for distance of over 300 mm from ground level.

2.12 SAFETY PRECAUTIONS All chemicals used for anti-termite treatment are poisonous and hazardous to health. These chemicals can have an adverse effect upon health when absorbed through the skin, inhaled as vapors or spray mists or swallowed. Person using or handling these chemicals should be warned of these dangers and advised that absorption through the skin is the most likely source of accidental poisoning. They should be cautioned to observe carefully the safety precautions given below. These chemicals are usually brought to site in the form of emulsifiable concentrates. The containers should be clearly labeled and should be stored carefully so that children and pets cannot get at them. They should be kept securely closed. Special care should be taken to prevent skin contact with concentrates. Prolonged exposure to dilute emulsions should also be avoided Workers should wear clean clothing and should wash thoroughly with soap and water, especially before eating or smoking. In the event of severe contamination, clothing should be removed at once and the skin washed with soap and water, if chemicals splash into the eyes they should be flushed with plenty of fresh water and immediate medical attention should be sought. The concentrates are oil solutions and present a fire hazard owing to the use of petroleum solvents. Flames should not be allowed nearby during the mixing. Care should be taken in the applications and present a fire hazard owing to the use of petroleum solvents Flames should not be allowed nearby during the mixing. Care should be taken in the application of chemicals to see that they are not allowed to contaminate wells or springs which serve as source of drinking water.

2.13 GUARANTEE The contractor shall guarantee through a guarantee bond, the anti-termite work for 10 years from the date of completion of the project, and shall indemnify the Project-in-charge against

any defects that arise therein during the guarantee period as aforesaid. They shall immediately rectify, any defects that may occur therein, and repair all other damage occurring to any part of the structure on account of defect in Anti-termite treatment, during the guarantee period of aforesaid.

3. SPECIFICATION FOR CAST – IN – SITU REINFORCED CEMENT CONCRETE

3.1 GENERAL

3.1.1 DESCRIPTION This section covers the requirements for finishing of cement concrete, proportioning, batching, mixing, testing, placing, compacting, finishing, jointing, curing and all other work as required for cast in place reinforced concrete. The contractor shall provide all the materials including cement, steel, labour, equipment, 'form work', scaffolding etc., required for completion of all reinforced concrete works as per drawings and documents. Cement concrete shall be composed of cement, fine aggregate, coarse aggregate, water, with or without admixture as approved, proportioned and mixed as specified herein.

3.1.2 RELATED WORK SPECIFIED ELSEWHERE a) Steel reinforcement b) Form work

3.1.3 APPLICABLE CODES AND STANDARDS The codes and standards generally applicable to the work of this section are listed hereinafter. IS 383 Coarse and fine aggregates from natural sources for concrete IS 456 Code of practice for plain and reinforced concrete IS 516 Methods of testing for strength of concrete IS 1199 Methods of sampling and analysis of concrete IS 1838 Performed fillers for expansion joints in concrete non-extruding and resilient type IS 1946 Code of practice for use of fixing devices in walls, ceiling and floors of solid Construction IS 2389 Methods of testing of aggregate for concrete's IS 2505 Concrete vibrators, immersion type IS 2645 Integral cement water proofing compounds IS 3414 Code of practice for design and installation of joints in buildings IS 3558 Code of practice for use for immersion vibrators for consolidating concrete IS 4082 Recommendation on stacking and storage of construction materials at IS 7861 Code of practice for extreme weather concretizing IS 7861 Recommended practice for hot weather (part I) concretizing IS 8112 Ordinary Portland Cement grade 43 IS 12269 Ordinary Portland Cement grade 53 PART— I The following clauses are intended to amplify the requirements of the reference document listed above and the contractor shall comply with these clauses

3.2 SUBMITTALS

3.2.1 Material Report

3.2.2 Prior to start of delivery of materials required, the following shall be submitted by the contractor to the Consultant / Project-in-charge for approval Suppliers and / or sources of all consumable materials including cement, steel, fine and coarse aggregates, water additives, bricks and timber etc. Quality Inspection Plan to ensure continuing quality control of ingredients by periodic sampling, testing and reporting to the Consultant on the quality of materials being supplied

3.3 PLANT AND EQUIPMENT The contractor shall submit the following to the Consultant well in advance. The proposed program, methods and details of plant and Equipment for be used to testing of ingredients and concrete samples. The proposed program methods and details of plant & equipment to be used for concrete work.

3.4 REPORTS FOR INSPECTION AND TESTING During concreting operations, the contractor shall conduct inspection and testing as described under the list of mandatory tests in this volume and all reports thereon shall be submitted in summary form to the Consultant / Project-in-charge.

3.5 SCHEDULES Before commencement of the work the contractor shall prepare working schedules of concreting giving dates and rate of pour for each item of work and submit the same to the Consultant / Project-in-charge for their approval.

3.6 MATERIALS Before bringing to the site, all materials for cement concrete shall be approved by the Consultant / Project-incharge. All approved samples shall be deposited in the office of the Consultant / Engineer-incharge before placing orders for the materials with suppliers The materials brought on to the work shall conform in every respect to their approved samples. Fresh samples shall be deposited with the Consultant / Project-in-charge whenever type or source of any material changes The contractor shall check each fresh consignment of materials as it is brought on to the works to ensure that they conform to the specification and / or approved samples. The Consultant / Project-in-charge shall have the option to have any of the materials tested to find whether they are in accordance with specifications at the contractor ‘s expense. All bills vouchers and test certificates which in the opinion of the Consultant / Project-in-charge are necessary to convince him as to the quality of materials or their suitability shall be produced for his inspection when required. Any materials which have not been found to the specification and not approved by the Consultant / Projectin-charge shall be rejected forthwith and shall be removed from the site by the Contractor’s at his own cost within the time stipulated by the Consultant / Project-in-charge. The Consultant / Project-in-charge shall have the powers to cause the contractors to purchase and use materials from any particular source, as may in their opinion be necessary for the proper execution of work.

3.6.1 CEMENT Cement shall be provided by the Contractor. On the following types of cement as specified shall be used a. Ordinary Portland Cement 43 grade confirming to BIS 8112-1987 b. Ordinary Portland Cement 53 grade confirming to BIS 12269-1987 Cement at site shall be stored in dry weather proof go-downs (or shed) built by the Contractor at his own costs in stacks which are not higher than 10 bags. The cement go-down shall be constructed as per CPWD specifications. The contractor shall conduct all necessary tests as specified in the IS, at his own cost to ascertain himself on quality of the material.

3.6.2 AGGREGATES

a) Aggregates from natural sources shall be in accordance with IS:383. The contractor shall submit to the Consultant / Project-in-charge certificates of grading and compliance from the suppliers for all consignments of aggregate. In addition at site from time to time, the contractor shall test the aggregates in accordance with IS: 2386 parts I, II, III and IV. The contractor shall allow for and provide all necessary ap paratus for carrying out each test and for supplying test records to the Consultant.

b) For fair faced concrete, the contractor shall ensure that aggregates are free from iron pyrites and impurities which may cause discoloration.

c) The fine aggregates shall be river sand, stone dust or other approved sand. It shall be free from clay, loam, earth or vegetables matter and from salt or other harmful chemical impurities It shall be dean sharp, strong angular and composed of hard siliceous material. The grading of sand as determined by the method prescribed in IS: 2386 part I shall be within the limits of grading zone III given in Table

1. When the grading falls outside the percentage limits given for sieves other than 600 micron, 300 micron, and 150 micron (I.S) sieves by not more 5 percent, it shall be regarded as falling within this zone. The 5 percent can be excess submission on one more service.

FINE AGGREGATE TABLE

1 I. S. Sieve Percentage passing for Grading IV ZONEI ZONEII ZONEIII ZONE 10 mm 100 100 100 100 4.75 mm 90-95 90-100 90-100 95-100 2 36 mm 60-95 75-100 85-100 95-100 1.18mm 30-70 55-90 75-100 90-100 600 micron 15-34 35-59 35-60 80-100 300 micron 5-20 8-30 8-30 20-65 150 micron 0-10 0-10 0-10 0-15 The maximum quantity of silt as determined by the method prescribed in IS: 2386 Part II shall not exceed 8%. Stone dust shall be within the limits of Grading Zone III given in table

1. When the grading falls outside the percentage limits given for the sieves other than 600 micron and 300 micron (IS) sieves by not more than 5 percent and on 150 micron sieves by not more than 20 percent it shall be regarded as falling within this zone. The 5 percent can be excess summation on one or more sieves. COARSE AGGREGATE The coarse aggregate shall be crushed stone or broken stone. Coarse aggregate obtained from crushed or broken stone shall be angular, hay, strong, dense, durable clean and free from soft, friable, thin, flat, elongated flaky pieces. The coarse aggregate should be from the approved source/quarry. Coarse aggregate River shingle or pit gravel shall be rounded, sound hard, clean, non porous, suitably graded in size with or without broken fragments and free from flat particle of shale, clay, silt, loam and other impurities. Except where it can be shown to the satisfaction of the Consultant than a supply of properly graded aggregate of uniform quality can be maintained over the period of the obtaining the coarse aggregate in different sizes & blending them in correct proportions as and when required. The maximum size of coarse aggregate shall be such that the concrete can be placed without difficulty so s to surround all reinforcement thoroughly and fill the comers of form work.

3.6.3 WATER Water used in the works shall be potable water and free from deleterious materials. Water used for mixing and curing concrete as well as for cooling and/or washing aggregate shall be fresh and clean, free from injurious amounts of oil, salts, acids, alkali, other chemicals and organic matter. Water shall be from the source approved by the Consultant / Project-in-charge and shall be in accordance with Clause 4.3 of IS: 456. Before starting any concreting work and whenever the source of water changes, the water shall be tested for its chemical and other impurities to ascertain its suitability for use in concrete for approval of the Consultant. No water shall be used until tested and found satisfactory. Cost of all such tests shall be borne by the contractor.

3.6.4 ADMIXTURES AND ADDITIVES Chemical admixtures are not to be used until permitted by the Consultant/Project-in-charge in case their use is permitted, the type, amount and method of use of any admixture proposed by the contractor shall be submitted to the Consultant for approval The contractor shall further provide the following information concerning each admixture to the Consultant/Project-in-charge.

a) Normal dosage and detrimental effects, if any, of under dosage and over dosage.

b) The chemical names of the main ingredients in the admixture.

c) The chloride ion content, if any, expressed as a percentage by weight of admixture.

d) Whether or not the admixture leads to the entertainment of air when used in the manufacturer's recommended dosage. e) Where two or more admixtures are proposed to be used in any one mix, the manufacturer's written confirmation of their compatibility. In reinforced concrete, the chloride ion of any admixture as determined in accordance with IS: 6925 and the total chloride ion in all admixtures used in concrete mix shall not exceed 0.30n percent by weight of cement. The admixtures when used shall conform to IS: 9103. The suitability of all admixtures shall be verified by trial mixes. The addition of calcium chloride to concrete containing embedded metal will not be permitted under any circumstances. Regarding admixtures when used shall be based on lingo-sulphonates with due consideration to clause 5.2 and 5.30 of IS: 7861. Waterproofing admixtures shall comply with IS: 2645.

3.7 PLANT The contractor shall obtain the approval of the Consultant/Project-in-charge for all plant items he proposes to use for the manufacture and placing of concrete. The arrangement shall maintain all items of plant at all times in a clean and efficient working condition.

3.8 STORAGE All goods and products covered by these specifications shall be procured well in advance and stored as specified below.

3.8.1 CEMENT Cement shall be stored on a raised floor in dry weather proof & dust free but well-ventilated shed. Cement bags shall be stacked close together away from external walls and in stacks of not more than ten bags to avoid lumping under pressure. Cement stored during monsoons or cement expected to be in store for more than eight weeks shall be completely enclosed in 700-micron polyethylene sheet so arranged that the flap closes on the top stack. The contractor shall ensure that protective polyethylene sheet is not damaged at any time during use. Consignments of cement shall be used in order of delivery A record shall be kept of the batch numbers of cement deliveries in such a form that the part of the works in which the cement is used can be readily identified. If during delivery or by test, the cement is found to be defective, the same shall be returned back forthwith. The contractor shall be responsible for the storage of cement at the site and no claim will be entertained in the event of any damage occurring to cement due to faulty storage by the contractors or on account of his negligence. Cement stored on site for a period longer than eight weeks shall be tested to the satisfaction of the Consultant/Project-in-charge before it is used in the works. Cement that has failed the tests conducted shall not be used in the works and shall be removed from the site immediately without fail.

a) For concreting in very narrow space or in very small thickness 12 mm

b) For all reinforced concrete work except in massive foundations 20 mm

c) For all ordinary plain concrete and massive reinforced foundations 10 mm

3.8.2 STORING OF AGGREGATE

Aggregates shall be stored on a suitable well drained raft of concrete, timber, metal or other approved material. The storage of aggregates on the ground will not be permitted. Each size of aggregate shall be stored separately in such a manner as to prevent spillage and mixing of one aggregate with an adjacent aggregate The dividing walls of any bin shall be of sufficient height and the aggregate shall be so deposited that a distance of 100 mm shall be left between the top of the division wall and any part of the aggregate stack When stack piling, the aggregate shall not form

pyramids resulting in segregation of different size particles. The stacks shall be regular and of a height not exceeding two meters.

3.9 GRADES OF CONCRETE The grades of concrete shall be in accordance with the following table. The grade of concrete to be used in each section of work will be shown in the drawings or in the Bill of Quantities: CHARACTERSTIC STRENGTH Grade of Concrete Grade of Concrete Characteristic strength i.e. compressive strength of 15 cm. Cubes at 28 days (N/mm2) Nominal maximum aggregate size (mm) 10 10 25 15 15 25 20 20 20 25 25 20 30 30 20 35 35 20 Unless otherwise specified in the drawings, the maximum nominal size of coarse aggregates for different grades of concrete shall be as under: All mix design grades viz., M10, M15, M20, M25, M30 etc., shall be designed and have a minimum cement content as follows: Grade Qty (in kg) M-10 200 M-15 300 M-20 400 M-25 600 M-30 800 Minimum content of cement remaining unchanged, as specified above for each type of concrete mix, the proportion and quantities of local sand and aggregate are to be worked out and determined in the field/laboratory as per Road Research Note No.4, Department of Scientific and Industrial Research, United Kingdom for design of concrete mixes or as per ACI 613 with the approval of the Engineer. Any change in the source of aggregates will require the re-designing of the concrete mix for the Engineer's approval.

3.10 Mix Design At the commencement of the contract, the Contractor shall make preliminary tests to determine the proportions by weight of cement, fine aggregates, coarse aggregates and water necessary to produce required grades of concrete. The mix proportions shall be selected to ensure that workability of the fresh concrete is suitable for the conditions of handling and placing and when concrete hardens, it shall have the required strength, durability and surface finish. The Contractor shall get approval of the Engineer to such proportions before start of concreting. However, such approval shall not relieve the Contractor of his responsibility to produce concrete having compressive strengths as laid down in the foregoing table. No departure from the approved proportions will be permitted during the works unless and until the Engineer gives written authorization for any change in proportion. The Engineer shall have authority at any time to check whether the mixing of concrete is being carried out according to the approved proportions. For the major and important RC works and for all special works, the design of mixes shall be made by the Contractor at his own cost, for each grade of concrete as well as for various workability. The design of mixes shall be made according to relevant I.S. codes or to approved standard methods. The concrete made by designing the mix is termed hereinafter as "Design Mix Concrete".

3.11 Water/Cement Ratio Where a particular water/cement ratio is stipulated in the design or drawing along with the characteristic grade of concrete, the design of mix shall be carried out by adjusting the other variable factors to obtain characteristic strength of concrete with stipulated water/cement ratio. In the structures where the impermeability and shrinkage of concrete have an important bearing on the durability and serviceability of the structures, such as water retaining structures, basements, underground premises, tunnels, pump houses, exposed structures near sea side or deserts, pre-stressed structure, thin precast members etc., the water/cement ratio shall be kept low and preferably not exceeding 0.45. The water cement ratio as achieved in the mix design or as specified in the drawings shall be adhered to strictly and shall not be varied without the permission of the Engineer.

3.12 Workability The workability of fresh concrete shall be such that the concrete is just suitable for the conditions of handling and placing so that after compaction, it becomes completely consistent and homogeneously surrounds all the reinforcement and completely fills the formwork. The workability of fresh concrete at the place of batching/mixing shall be measured by compacting factor test and at

the place of disposition by means of slump test. During the finalization of trial mixes, the relationship between compacting factor and slump test shall be established for each grade of concrete as well as for various levels for workability. Normally, in the condition of low water cement ratio as well as for medium/high workability, the workability shall be achieved by increasing the cement content. In cases where the cement content is to be limited to reduce the heat of hydration, and the water / cement ratio is also to be kept low to reduce the permeability or due to other requirements the desired workability may be achieved with the use of limited doses of plasticizer or air entraining agent. In such cases, the method of mixing and dosage of the plasticiser / air entraining agent shall be according to the manufacturer's specification and with the approval of the Engineer. Consistency and workability of concrete shall be checked by measuring the slump of a truncated cone of concrete straight from the mixer under normal working conditions. The conical mould shall be of metal, 300 mm high and 100 mm and 200 mm in diameter at top and base respectively. Moulds shall be prepared by the Contractor. The slump range of concrete shall be as per the tabulation given below, as well as standards. Slump tests shall be performed as per IS:1881 at intervals established by the Engineer at the Contractor's cost in such a way as to check that the degree of consistency established by the Engineer for work in progress is maintained. The table below gives the general slump range to be followed for various types of construction unless otherwise shown on drawings or instructed by the Engineer. Various types of construction ....Slump (in mm)... Max. Min. Reinforced foundation walls and footings 80 35 Plain footings, caissons and structure walls 75 30 Compressor foundations and for heavy mass constructions 50 20 Pumps and other misc. equipment foundations 75 35 Columns, slabs, beams and reinforced walls 100 50

3.13 Durability The durability of concrete, depending on the exposure condition, is to be taken into account while designing the mix. For given aggregates, the cement content should be sufficient to make sufficiently low water/cement ratio and Appendix A of IS: 456 shall be taken as guideline for durability considerations.

3.14 Trial Mixes After approval of the mix design by the Engineer, the Contractor shall make in presence of the Engineer the trial mixes for each grade of concrete as well as for required workability. Before starting the trial mixes, necessary preparatory works like determination of sieve analysis of the aggregates, densities of different ingredients, moisture contents in the aggregates, shall be completed according to the relevant BIS Codes. Each trial mix shall be handled and compacted by the method which the Contractor proposes to use for that mix in the works and the mixes shall not show tendency of inadequate compaction by the method proposed. The compacting factor and the slump of each trial mix shall be determined immediately after mixing and the values shall not exceed the maximum value obtained in the mix design. Five (5) 150 mm test cubes shall be made from each trial mix. These shall be cured and tested in accordance with relevant BIS codes. In order to have the specified characteristic strength in the field, the concrete mix as designed in the design mix shall have higher average compressive strength depending on the degree of quality of control at site. Before commencement of the concreting works of particular grade of concrete, the Contractor must complete the work of trial mixes and subsequent testing of the test cubes obtained there from and the desire of the approved mix for that particular grade of concrete. The entire cost of all the trial mixes including all the preparatory works for trial mixes, preparation of test cubes and their testing shall be borne by the Contractor.

3.15 Nominal Mix Concrete Nominal mix concrete may be used for all concrete of grade M-10 and below. If design mix concrete cannot be used for any reason for grade M-15 and M-20, nominal mix concrete may be used with the permission of the Engineer. Nominal mix concrete shall be in

accordance with Table-3 of clause 8.3 of I S 456. The stipulations of clauses 8.3.1 and 8.3.2 of IS: 456 shall also be taken into consideration..

3.16 Volumetric Mix Concrete Where concrete is specified in volumetric proportions such as 1:4:8, 1:3:6, 1:2:4, 1:1.5:3, 1:1:2 etc., in the Bill of Quantities, coarse & fine aggregates shall be measured by volume & cement by weight. The water cement ratio shall be within 0.45 & 0.70 depending upon the workability.

3.17 Batching of Concrete 3.17.1 Cement Cement shall always be batched by weight. A separate weighing device shall be provided for weighing cement. Where the weight of cement is determined by accepting the weight per bag, a number of bags shall be weighed separately to determine the average net weight of cement per bag and the same shall be checked regularly. 3.17.2 Aggregates: For both design mix concrete and nominal mix concrete, the aggregates,(coarse and fine) shall be batched by weight. In particular cases, or where weight-batching is not possible, proportioning by volume batching may be allowed by the aggregates throughout the period of construction. For this purpose, the Contractor shall submit to the Engineer sufficient data indicating the weight/volume relationship of the aggregates shall be made by the Contractor to the satisfaction of the Engineer. Where aggregates are moist and volume batching is adopted, allowance shall be bulking in accordance with IS (Part III). Suitable adjustments shall be made for the variation in the weight of aggregates due to variation in their moisture contents.

3.18 Water

3.18.1 General Water may be measured either by weight or by volume. When measured by volume, it shall be by well calibrated conical shaped jar or vessel or from a calibrated tank filled to the mixer. Adjustment of Water Due to Moisture Contents in Coarse and Fine Aggregates It is very important to maintain the water cement ratio constant at its correct value. For the correct determination of the amount of water to be added in the concrete mix, to maintain the water cement ratio constant, the amount of moisture content in both coarse and fine aggregates shall be taken into consideration, be checked as frequently as possible, the frequency for a given job being determined by the Engineer according to weather condition. Determination of Moisture Content in the Aggregates Determination of moisture content in the aggregates shall be according to IS 2386 (Part-III). Where tests are not conducted, the amount of surface water may be estimated from the following table: Aggregates Surface water Carried by Aggregates % by weight l/m3 Very wet sand 7.50 120 Moderately wet sand 5.00 80 Moist San 2.50 40 Moist gravel stone chips* 125.25 20-40 • coarser the aggregate, less the water it will carry.

3.18.2 Admixtures Any solid admixture, to be added, shall be measured by weight, but liquid or semi-liquid admixture may be measured by weight or volume. The Bidder shall indicate the brand name, the Manufacturer and the properties of any admixture to be used for the concrete as per Bill of Quantity items or on his own initiative.

3.18.3 Accuracy of Batching The accuracy of batching shall be within the following tolerance: 1 Cement within + 2% by weight 2 Aggregate within + 5% by weight 3 Water within + 0.5% by weight.

3.19 Mixing of Concrete

3.19.1 Machine Mixing Concrete shall always be mixed in mechanical mixer. Water shall not, normally, be charged into the drum of the mixer until all other ingredients are already in the drum and mixed

for at least one minute. Mixing shall be continued until there is uniform distribution of materials and the mass is uniform in colour and consistency. The mixing time from the time of adding water shall be in accordance with IS 1791, but in no case less than 2 minutes or at least 40 revolutions.

3.19.2 Hand Mixing When hand mixing is permitted by the Engineer, it shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the mass is uniform in colour and consistency. In case, of hand mixing, 10% extra cement shall be added to each batch at no extra cost to EMPLOYER,

3.20 Transportation of Concrete Concrete shall be transported from the place of mixing to the place of placing concrete as rapidly as practicable by any means, which will prevent the segregation or loss of any of the ingredients and maintain the required workability. No water shall be mixed with the concrete after it has left the mixer. Where concrete is transported over long distances, the Contractor shall provide suitable means by which different grades of concrete are readily identifiable at the place of final deposit.

3.21 Preparatory Works/Surface Preparation

3.21.1 For Concrete Directly on Earth Foundation Earth foundation on which direct placement of concrete is specified, shall be rammed and consolidated as directed by the Engineer such that it does not crumble and get mixed with concrete during or after placement. If the foundation is quite wet, the same shall be kept dry and then sufficiently consolidated, if necessary, a thin top layer of the wet soil shall be removed and replaced by sand or other suitable materials as directed by the Engineer without extra cost to EMPLOYER, Care shall also be taken that earth from the sides also does not get mixed with the concrete, during or after placement, before it has sufficiently set and hardened. The earth foundation, over which concrete is to be placed directly, shall not be kept abandon at the specified level and concrete shall be placed immediately following otherwise suitable measures shall be taken, as directed by the Engineer without extra cost to EMPLOYER.

3.21.2 For Construction Joints Concrete shall be cast, as far as possible, continuously until the parts of structure to be built are finished. Should this not be feasible, the type, number and location of construction joints shall be approved by the Engineer prior to placing concrete. All such joints shall have continuous square bond grooves to produce substantial and water-tight-key and the exposed faces of joints shall be monolithic with the main mass of concrete formed and completed under substantially shattered faces. The Contractor shall take all the necessary steps by means of timber edgings etc. to ensure an exact horizontal straight finish to outside edge of any lift of concrete. Subject to the approval of the Engineer, the Contractor is at liberty to arrange his own construction joints but the following restrictions are to be observed:

1. There shall be no vertical construction joints

2. No longitudinal joints shall be made in the walls and floors of trenches and pits unless otherwise shown in the drawings.

3. Concrete pouring shall be reasonably large, but in no case shall the height of pouring concrete exceed 1.5 m without the Engineer's firm approval. Such approval of the Engineer shall not in any way relieve the Contractor of his responsibility to ensure that the construction is water tight and that no segregation takes place.

4. Laitance shall be removed from the surface of concrete before it has set hard by washing and wire brushing so as to expose the stones of the top layer without undue erosion of the mortar or damage to the under laying concrete. All beds and joints in concrete faces, which have become set, are to be picked all over and all loose materials removed before fresh concrete is deposited thereon. The indentations shall be at least 12 mm deep and not less than seventy five percent of the area of the existing concrete face to be covered over. Immediately before depositing fresh concrete, the exposed surface shall be cleaned of foreign matter by further wire brushing, if necessary. It shall then be thoroughly washed and surplus water removed. The surface, while still moist, shall be covered with layer of 1:1 cement mortar which must be vigorously stippled into the surface by means of a stiff brush, the depositing of the fresh concrete following on closely. Pockets to form keys shall be left in the surface of the concrete at constructional joints, 75 mm deep and approximately equal to 20% of the exposed surface. All costs in connection with the forming of construction joints shall be to the account of the Contractor and shall be deemed to be included in the rates for concreting and formwork and shall not be separately paid for. In a column, the joint shall be formed 75 mm below the lowest soffits of the beams, including haunches, if any. Concrete in a beam shall be placed throughout without a joint but if the provision of a joint is unavoidable, then the joint shall be vertical and at the centre of, or within, middle third of the span, unless otherwise shown on the drawings.

3.21.3 On Vertical Surfaces of Masonry

When the concrete is placed on the vertical surface of masonry (as in the case of thin concrete fins projected from the vertical masonry surface), a groove of dimension as directed by the Engineer shall be cut in the masonry to ensure a proper bond and the surface shall be cleaned thoroughly. Before the placement of concrete, the surface shall be kept moist by spraying water at least for the period of 2 hours and a thick coat of cement slurry shall be applied immediately before the placement of concrete. Inside the Form Works (Cleaning, Surface Preparation etc.) The interior of the form works, where the concrete is to be placed, shall be thoroughly washed by high pressure water jet or air jet to completely clean the entire volume from the dirts, grease/oil foreign and deleterious materials etc. The reinforcements shall be completely cleaned and free from all sorts of dirts grease/oil, rust, foreign/deleterious materials etc. Before placement of concrete, the form works coming in contact with concrete, shall be coated highly with form oil or raw linseed oily material or provided with any approved material to prevent adhesion of concrete to the form work, but utmost care shall be taken so that such oily material does not come in contact with the reinforcement.

3.22 Placing and Compaction of Concrete Before placing the concrete, the Contractor shall ensure that:

1. All mixing and placing equipment is thoroughly cleaned

2. All concreting space is free from debris and rubbish

3. All forms have been thoroughly wetted or oiled and firmly installed in line and plumb to the Engineer's approval.

4. All reinforcement is cleaned of loose rust, scales and other injurious adherents and is firmly bound and correctly placed and has been so approved by the Engineer.

5. All inserts, sleeves, foundation bolts and embedded parts have been correctly and firmly installed to conform to the Engineer's drawings and have been carefully checked to comply with the drawings.

Special care shall be taken to locate and check sleeves or inserts, which may not be symmetrically placed with respect to centre lines. The Contractor and Engineer shall separately inspect and check the above mentioned points and record and sign the results in a register which shall be maintained by the Contractor in a approved form. No concrete shall be placed without the Engineer having inspected and approved in writing. Inspite of ensuring the above requirements, the Contractor shall fill pour cards furnishing the necessary details of the job, duly signed by the Engineer. This, however, will not absolve the Contractor from his responsibility to correctly execute the work. Pour cards shall contain the following information: Design Index - Date - Slump - Workability - Work test specimen - Type of finishing and admixtures used (if any) - Period of removal of shuttering/props/forms.

a. The concrete pouring method shall be submitted to the Engineer for approval and shall always be such as to avoid any possibility of segregation of the components or shifting of the reinforcement.

b. Special grout or mix shall be used for difficult and intricate locations as specified by the Engineer. During placing, the concrete shall be thoroughly worked around reinforcement, embedded parts and corners of the formwork.

c. Greatest possible care shall be taken by the Contractor that reinforcement and embedded parts, particularly foundation bolts and sleeves, are not displaced during placement of concrete. While concreting mats and other such locations where top and bottom reinforcement are adopted, top reinforcement shall be thoroughly cleaned of all slurry and mortar sticking to them at the time of concreting top layers.

d. The concrete shall be placed and compacted before setting commences and should not be subsequently disturbed. No water shall be mixed with the concrete after it has left the mixer. Method of placing should be such as to preclude segregation. Approved mechanical vibrator shall be used for compacting concrete, and concrete shall not be non vibrated or under vibrated. No concrete shall be placed until the place of deposit has been thoroughly inspected and approved by the Engineer, all inserts and embedment properly secured in position and checked and forms properly oiled. No concrete shall be placed in the absence of the Engineer.

e. Concrete shall be placed on clean bed having the designed level. The bed shall be cleaned of all debris and other objectionable materials. Seepage water, if any, shall be controlled or diverted.

f. Concreting shall not be carried on during rains unless all precautions have been taken by the Contractor and necessary permission has been given by the Engineer. Suitable measures shall be taken to control the temperature of concrete.

g. Where plums are permitted in massive concrete, they shall be washed and carefully placed. No stone shall be closer than 30 cm to an exposed face, nor nearer than 15 cm to an adjacent stone.

h. Concrete shall not be dropped from a height of more than 2 m except through a chute, the design and type of which shall be subjected to approval of the Engineer.

i. The concrete shall be placed, spread and compacted by approved mechanical vibrator. Vibrators shall not be used for pushing concrete to adjoining areas.

j. For members involving vertical placing of concrete (e.g. columns, walls etc.), each lift shall be deposited in horizontal layer extending for the full width between shuttering and of such depth that

each layer can be easily and effectively vibrated and incorporated with the layer below by means of compaction being employed.

k. For members involving horizontal placing of concrete (e.g., slabs, beams etc.), the concrete shall be placed along the line of starting point in such quantities as will allow members to be cast to their full depth along the full width between side shuttering and then gradually brought towards the finishing point along its entire front parallel to the starting line. Vibration and surface finish shall follow behind the placement as closely as possible.

l. Utmost care shall be taken to avoid the displacement of reinforcements/ embedded parts or movement of form work or damage to faces of the form work or transmission of any harmful vibration/shocks to the concrete which has not yet hardened sufficiently.

m. All members shall be concreted at such a rate that no cold joint is formed and fresh concrete is placed always against green concrete, which is still plastic and workable.

n. Should any unforeseen occurrence result in a stoppage of concreting for one hour or such other time as might allow the concrete, already placed, to begin to set before the next batches can be placed, the Contractor shall make at his own cost, suitable tongue, and groove construction joint, as approved by the Engineer. Any additional reinforcement required as directed by the Engineer shall also be provided by the Contractor at his own cost. Before placement of new batches of concrete over that construction joint, the surface preparation according to this specification stipulated earlier, shall be done by the Contractor.

o. The concrete shall be worked well up against whatever surface it adjoins and compacted to such a degree that it reaches its maximum density as a homogeneous mass, free from air and water holes and penetrates to all corners of moulds and shuttering and completely surrounds the reinforcement. All measures shall be taken to make the shape, size, and location of the finished concrete including its embedment, holes, openings etc, well within the accepted tolerance limit.

3.23 Construction Joints Normally, the construction joints including crack inducing joints shall be constructed as per locations and details indicated on the drawings. Where the location of the joint is not specified in the drawings, it shall be in accordance with the following guidelines. In all construction joints, the reinforcements shall pass through as per drawings and the same shall not be disturbed in any way.

a) In Columns

i) In case of Projection from Basement Slab, 300 mm from the top of base slab or 75 mm from the top of the haunches whichever is higher.

ii) In framing the beam at different elevation, 75 mm below the lowest soffit of the beam and in case of projection from beams and slabs 75 mm from the top surface of the beam/slab or at the top surface of beam/slab whichever facilitates formwork.

iii) For columns below flat slabs, 75 mm below the lowest soffit of the slab.

b) In Walls (Horizontal Construction Joints)

i) For Walls Projecting From Base Slab, 300 mm from top of base slab.

ii) For Walls supporting the suspended slab, 75 mm from the lowest soffit of the slab. Note: In the case of water retaining structures and structures under the influence of ground water, approved water bars of suitable size shall be provided to make the joint completely watertight.

c) In Beams Beams shall be cast, as a rule, without a joint. But if provision of a joint is unavoidable, the joints from simply supported beam shall be vertical and at the middle of the span; in continuous beam, the same shall be at the point of minimum shear force.

d) In Suspended Slabs

i) In slab of small span, there shall be reconstruction joints.

ii) In slabs of large span and continuous slabs, the Construction joint, if allowed by the Engineer, shall be vertical at the middle of span and at right angles to the principal reinforcement.

e) In Walls (Vertical Construction Joint) As a rule, walls shall be cast monolithically without any vertical construction joint, unless specified in the drawing. However, for a long wall, Engineer may allow vertical construction joint and the same shall be at the place of minimum shear force.

f) In Slabs Resting on Ground

i) For Plain Concrete Concreting shall be done in alternate panels not exceeding 10 m 2 in area. The largest panel dimension shall be 5 m.

ii) For Nominally Reinforced Slab The area of pour shall not exceed 40 m 2 and the maximum panel dimension shall not exceed 8m.

iii) For the Basement Slabs Which Act as Structural Member There shall be no construction joint.

g) In Ribbed Beams The beams shall be monolithic with the slab in one continuous operation.

3.24 Cold Joints :

An advancing face of pour, which could not be covered before expiry of initial setting time for unexpected reasons, is called a cold joint. The Contractor shall remain always vigilant to avoid cold joints. If however, a cold joint is formed due to unavoidable reasons, the following procedures shall be adopted for treating it:

1. If the concrete is so green that it can be removed manually and if vibrators can penetrate the surface without much effort, fresh concrete can be placed directly over the old surface and the fresh concrete along with the old concrete shall be vibrated systematically and thoroughly.

2. In case the concrete has hardened a bit more than (1), but can still be easily removed by a light hand pick, the surface shall be raked thoroughly and the loose concrete removed completely without disturbing the rest of the concrete in depth. Then a rich mortar layer of 12 mm thickness, shall be placed on one cold joint and then the fresh concrete shall be placed on the mortar layer and vibrated thoroughly penetrating deep into the layer of concrete.

3. In case the concrete at the joint has become so stiff that it cannot be remoulded and mortar or slurry does not rise in spite of extensive vibration, a tongue and groove joint shall be made by removing

some of the older concrete and the joint shall be left to harden at least for 12-24 hours. It will then be treated as regular construction joint and the surface preparation of the same, before placement of concrete, shall be as described in the appropriate clauses of these specifications.

3.25 Sub-standard concrete Should the work strength of controlled concrete fall below the specified strength, Engineer shall decide:

1. To reject the work, in which case the Contractor shall replace the defective work with concrete of required strength and bear all costs for dismantling and replacing including cost of associated form work, reinforcement, embedded parts & all associated works.

2. To accept the work at a reduced rate, in which case the unit rate payable for sub-standard work will be reduced by EMPLOYER, directly in proportion to the work strength as compared to the specified strength. The Engineer may, in addition, require other tests performed on the respective structural member so accepted period to its acceptance with or without necessary corrective measures and in each such case, the Contractor shall bear all costs for all such tests or corrective measures, besides the reduction in the unit rates as specified herein.

3. Concrete of strength below fifteen (15) percent of the specified strength will not be accepted.

4. The test load shall be 125% of the maximum superimposed load for which the structure was designed. Such test load shall not be applied before 56 days after the effective hardening of concrete. During the test, struts strong enough to take the whole load shall be placed in position leaving a gap under the members. The test load shall be maintained for 24 hours before removal.

5. If, within 24 hours of the removal of the load, the structure does not show a recovery of at least 75% of the maximum deflection shown during the 24 hours under load, the test loading shall be repeated after a lapse of alteast 72 hours. The structure shall be considered to have failed to pass the test if the recovery after the second test is not at least 75% of the maximum deflection shown during the second test. If the structure is certified as failed by the Engineer, the cost of the load test shall be borne by the Contractor.

3.26 Optional Tests The Engineer, if he so desires, may order tests to be carried out on cement, sand, coarse aggregate, water in accordance with the relevant Indian Standards. Tests on cement shall include

1. Fineness test

2. Test for normal consistency

3. Test for setting time

4. Test for soundness

5. Test for tensile strength

6. Test for compressive strength

7. Test for heat of hydration (by experiment and by calculation) in accordance with IS:269. Tests on sand shall include 1. Sieve test.

2. Test for organic impurities.

3. Decantation test for determining clay and silt content.

4. Specific gravity test.

5. Test for unit weight and bulkage factor.

6. Test for sieve analysis and fineness modulus. Tests on coarse aggregates shall include

1. Sieve analysis.

2. Specific gravity and unit weight of dry, loose and rodded aggregate.

3. Soundness and alkali aggregate reactivity.

4. Petrographic examination.

5. Deleterious materials and organic impurities.

6. Test for aggregate crushing value. Any or all these tests would normally be ordered to be carried out only if the Engineer feels the materials are not in accordance with the specifications or if the specified concrete strengths are not obtained and shall be performed by the Contractor at an approved test laboratory at the cost of the Contractor. If the work cubes do not give the stipulated strengths, the Engineer reserves the right to ask the Contractor to dismantle such portions of the work which, in his opinion, are unacceptable and re-do the work to standards stipulated, at the Contractor's cost. The unit rate for concrete shall be all inclusive, including making preliminary mix design and test cubes works, cubes, testing them as per specification, slump tests, optional tests etc.,

3.27 Concrete for Equipment or steel structures foundations:- Concrete for equipment foundation, whether principal or auxiliary, shall be poured continuously so that the structure becomes monolithic, particular care being exercised to see that the base slabs, if any, are of compact impervious construction. Tunnels, passages, apertures and so forth shall be provided in accordance with the drawings for the installation of mechanical and electrical equipment, pipes or cables. The top elevation of the equipment foundations or parts shall be accurately cast to 20/50 mm (or more as may be specified on the drawings) above the level required for grouting and it shall be pneumatically chiseled off and well roughened just prior to the erection of the equipment concerned. All embedded anchor bolts or bolt sleeves shall be accurately and firmly set with the aid of approved templates, steel supports and/or other accessories. For holding the embedded bolts or sleeves in the correct position during concreting, template shall have to be of steel of suitable section approved by the Engineer. Two sets of templates shall have to provided, one to hold the bottom and the other the top of the bolts or sleeves. The bottom template shall be securely and rigidly fixed by providing anchorage arrangement and by welding to the lowest part of the steel reinforcement and other structural supports. The top templates shall be securely fixed by tying with guy wires and turn buckle arrangements to firm and rigid adjoining structures and staging. The bottom template that is embedded in concrete will be measured and paid for as embedded steel. Bolt pockets, where required, shall be cast with wooden taper wedges. These shall be withdrawn at an appropriate time when the concrete has set, the pockets cleaned, roughened and then covered or blocked thoroughly

to prevent debris getting into these. The exposed portions of bolts and embedded parts shall be kept well greased and adequately protected from damage throughout construction. Any damages found shall have to be corrected at the Contractor's cost. EMPLOYER, shall have the right to use the foundations, pads, piers, slabs, floors and all concrete work as needed for other works or equipment erected prior to its "Taking Over".

3.28 Requirements for Concreting in Special Cases

3.28.1 Concreting in Deep Lifts N.A.

3.28.2 Concreting Under Water N.A.

3.28.3 Cold Weather Concreting N.A.

3.28.4 Hot Weather Concreting N.A.

3.28.5 Concreting in Large Pours (Mass Concrete) N.A.

3.29 Finishes to Exposed Surface of Concrete The Contractor is to include his quoted rate for concrete, the provision of normal finishes in both formed and unformed surfaces as and where required by the Engineer without any extra cost to EMPLOYER, Some common finishes are indicated below:

3.29.1 Surfaces which do not Require Plastering Surface in contact with casing shall be brought to a fair and even surface by working the concrete smooth against casings with a steel trowel while it is being deposited and also by working over the surface with a trowel immediately after the removal of the casings or centering, removing any irregularities and stopping air holes, etc. Use of mortar plaster is not permissible for correcting levels, removing unevenness etc. However, if in the opinion of the Engineer, such plastering is unavoidable, then the thickness of plaster shall in no case exceed 5 mm and the plastering shall be in CM (1:3).

3.29.2 Faces of Foundations which will be Back Filled Neither the smoothness of the surface not the positions of the joints in the form work are important. Small blemishes caused by entrapped air are permitted. No special surface finish is required.

3.29.3 Exposed Surfaces Surface of beams/columns flushing with the block work or other structures where it is intended to plaster, shall be backed adequately as soon as the shuttering is stripped off so that proper bond with the plaster can develop.

3.29.4 Surface for Non-integral Finish Where a non integral finish such as floor finish is specified or required, the surface of the concrete shall be struck off at the specified levels shall be furnished and finished rough.

3.29.5 For Monolithic Finish Where no more finishing course is to be supplied as in the case of basement floor, industrial flooring or the screed concrete flooring etc., the concrete shall be completed and struck off at the specified levels and slopes in a screed board and then floated with a wooden float. Steel trowel ling is then started after the concrete has hardened enough to prevent the excess of fines and water to rise to the surface but not hard enough to prevent proper finishing. Trowelling shall be such that the surface is flat, smooth and neatly finished.

3.30 Curing of Concrete

3.30.1 General The purpose of curing is either to provide sufficient water at optimum temperature or to prevent loss of moisture from the concrete itself so that the cement inside the concrete is sufficiently hydrated which, of course, is a slow and prolonged process. As soon as the concrete has hardened sufficiently, the curing shall be started.

3.30.2 Different Methods of Curing Any one of the following may be used for curing as approved by the Engineer. a) Curing by Direct Water This is done either by pounding or spraying water. Ponding Ponding is widely used for curing slabs and pavement. Earth bands are formed over the slabs and water is pumped or poured into them and the same is replenished at interval to make up for the loss of evaporation. As this type of curing is one of the best methods, 10 days of curing after final setting is sufficient. By Spraying Water Curing is done by spraying water by suitable means at approved time intervals. While spraying, it shall be ensured that the complete area is covered. In order to avoid cracking, cold water shall not be applied to massive members immediately after striking the form work, while the concrete is still warm. Alternative wetting and over drying shall be avoided. Curing by spraying water shall be continued atleast for 18 days.

a) Curing of Concrete with Absorbent Material Kept Damp The entire concrete surface is covered either with hessian, burlap, sawdust, sand, canvas or similar material and kept wet continuously for at least 12 days after final settings.

b) Curing by Covering Concrete Surface with an Impressive Sheet This is achieved by covering the entire concrete surface with water proof paper or plastic sheets specially manufactured for this purpose. The waterproof papers are stuck together by adhesive compound and the plastic sheets can be welded at site. Such type of covering shall be kept at least for 24 days after the final setting. It is preferable to have sheet as white in appearance since the white colour will reflect hot sunrays and keep the concrete temperature at reasonable level.

c) Curing by Providing Protective Membrane by Applying curing compound This is achieved by applying a membrane forming compound (curing compound) over the concrete surface. Generally, these are available in the emulsion form. The application of the curing compound should be started immediately after stripping off the shuttering in case of formed surface and after the surface has hardened in case of unformed surface. The curing compound membrane forming emulsions dry up within 3 to 4 hours after application and forms a continuous coherent adhesive membrane over the concrete surface. Such membrane serves as a physical barrier to prevent the loss of moisture from the concrete itself. Membrane forming emulsions are generally coloured black or white to improve visibility for ensuring uniform application. Black colour shall never be used for curing in very hot weather. In order to prevent glare, a colouring pigment may be added to white compounds. Black curing compounds are either Bituminous or Asphaltic emulsions and shall be used to surfaces which are to be covered by back filling or on the floor which is to be covered with tiles and linoleum. White curing compound shall be used for the surfaces of tall structures under exposure of hot sun where other method of curing can not be properly ensured.

d) Curing by Chemical Coating For chemical curing, sodium silicate or calcium chloride is used. The use of calcium chloride shall be done with the approval of the Engineer. Normally, the sodium silicate mixed with water is applied over concrete surface and, when it dries up, it forms a thin varnish like film, which fills up the pores, and surface voids and prevents evaporation of water. This also acts like curing compound but only difference is that curing compounds are available in ready mixed emulsion forms while sodium silicate is to be mixed with water at site.

3.30.3 Limitation to Use of Different Methods of Curing

i) Curing by the processes as indicated in Section B – Clause 3-24 and more specifically as per sub-clause 2(b) of the above clause gives very good results in normal warm climate for maturity of concrete.

ii) In cold weather, the process as indicated in sub-clause 2(b) of clause 3-24 gives very good result for maturity of concrete.

iii) Where water cement ratio is less than 0.5, the methods indicated in sub-clause 2(d) and 2(e) of clause 3-24 of Section B, shall not be used.

iv) In warm climate also, where the methods of curing as indicated in sub-clauses 2(a) and 2(b) of clause 3-24 cannot be properly ensured, any suitable method of curing as indicated in subclasses 2(c) to 2(e) of clause 3-24 of Section B, as approved/directed by the Engineer, shall be adopted.

3.31 Testing of Concrete

3.31.1 General The Contractor shall carry out, entirely at his own cost, all sampling and testing in accordance with the relevant IS standards and as supplemented herein. The Contractor shall get all tests done in an approved laboratory and submit to the Engineer, the test result in triplicate within 3 days after completion of the test.

3.31.2 Consistency Test (Tests of Fresh Concrete) At the place of deposition/pouring of the concrete, to control the consistency slump tests and/or compacting factor tests shall be carried out by the Contractor in accordance with IS 1199 as directed by the Engineer. The results of the slump tests/compacting factor tests shall be recorded in a register for reference duly signed by both the Contractor and the Engineer. That register shall be considered as the property of EMPLOYER, and shall be kept by the Contractor at site in safe custody. The results of the slump tests/compacting factor tests shall tally, within accepted variation of 12%, with the results in the respective design mix, in case of mix design concrete and with the values indicated in the table under clause 6.1 of IS:456 in case of nominal mix concrete. For any particular batch of concrete, if the results do not conform to the requirements as specified in IS 456, the Engineer has the right to reject that batch and the Contractor shall remove the same immediately from the site, at no cost to EMPLOYER,.

3.31.3 Strength Test of Concrete While placing concrete, the Contractor shall make six (6) 150 mm test cubes from particular batches of concrete as desired by the Engineer. The frequency of taking test cubes shall be either according to clause 14.2 of IS:456 or as directed by the Engineer. The cubes shall be prepared, cured and tested according to IS 516. Out of the six (6) test cubes, 3 shall be tested for compressive strength at 7 days after casting and the remaining 3 at 28 days after casting A register shall be maintained at site by the Contractor with the following details entered and signed by both the Contractor and the Engineer. That register shall be considered as the property of EMPLOYER,

a) Reference to the specific structural member

b) Mark on cubes

c) The grade of concrete

d) The mix of concrete

e) Date and time

f) Crushing strength at 7 days

g) Crushing strength at 28 days

h) Any other information directed by the Engineer. 3.31.4 Acceptance Criteria for Test Cubes The acceptance criteria of concrete on strength requirement shall be in accordance with the stipulations under clause 15 of IS:456. 3.31.5 Non-destructive Tests on Hardened Concrete If there is doubt about the strength or quality of a particular work or the test results do not comply with the acceptance criteria as stipulated under clause 15 of IS:456, non-destructive tests on hardened concrete like core tests and/or load tests or other type of non destructive tests like ultrasonic impulse test etc. shall be carried out, as may be directed by the Engineer, by the Contractor at entirely his own cost. The core tests and load tests shall comply with the requirements of clause 16.6 of IS: 456.

3.31.6 Concrete Below Specified Strength In case of failure of test cubes to meet the specified requirements, the Engineer may take one of the following actions:

1. Reject the work and instruct that section of the works to which the failed cubes relate shall be cut out and replaced at the Contractor's expense.

2. Instruct the Contractor to carry out additional tests and/or works to ensure the soundness of the structure at the Contractor's expense.

3. Accept the work with reduction in the rate in appropriate item.

3.31.7 Concrete failed in Non-destruction Tests In case test results of the core tests or load tests in a particular work do not comply with requirements of respective clause (16.3 for core test and 16.5 for load tests) of IS 456, the whole or part of the work concerned shall be dismantled and replaced by the Contractor as may be directed by the Engineer at no extra cost to EMPLOYER, and to the satisfaction of the Engineer. No payment for the dismantled concrete including relevant form work, reinforcement, embedded fixtures etc. shall be made. In the course of dismantling if any damage occurs to the adjacent structure or embedded item, the same shall be made good, free of charge by the Contractor, to the satisfaction of the Engineer.

3.32 EXPANSION JOINTS

3.32.1 GENERAL Expansion joints shall be provided where shown on the drawings or as directed by Consultant. They shall be constructed with an initial gap between the adjoining parts of the works of the width specified in the drawings. The contractor shall ensure that no debris is allowed to enter expansion joints Expansion joints shall be provided as per drawings. Contractor shall ensure that expansion joints are made water-tight and that no leakage occurs through these joints for which he shall be responsible to redo at his own cost.

3.32.2 OPEN JOINT FILLERS Where shown on the drawings, open joints in the structure shall be filled with joint fillers. The joint filler shall be easily and uniformly compressible to its original thickness, tampable, easily cut or sawn, robust, durable, resistant to decay due to termite or weathering,

unaffected by water and free of any constituent which will bleed into or stain the concrete. The joint filler shall be of same thickness of the joint width, it shall extend through the full thickness of the concrete unless otherwise specified and shall be sufficiently rigid during handling and placing to permit the formation of straight joints

3.32.3 JOINT SEALING COMPOUNDS Joints sealing compounds shall seal joints in concrete against the passage of water prevent the ingress of grit or other foreign material and protect the joint filler. The compound shall have good extensibility and adhesion to concrete shall have good extensibility and adhesion to concrete surfaces and shall have resistant to flow and weathering. Polysulphide joints where specified on the drawings shall be seated with polysulphide liquid polymer, stored, mixed handled, applied and cured strictly in dimensions, thoroughly cleaned and treated with recommended primer strictly in accordance with the manufacturer’s written instructions prior to sealing. The Contractor shall use only competent personnel experienced in the application of polysulphide for such work. Where specified in the drawings, rubber/bituminous based sealant shall be of an approved manufacturer. The treatment of the joint and the use of sealing compound shall be strictly in accordance with the manufacturer’s written instructions.

3.32.4 WATER BARS Where water bars are shown on the drawings, the joints shall incorporate an approved PVC external type water-bar complete with all necessary molded or prefabricated intersection pieces assembled in accordance with the drawings with bends and butt joints in running lengths made by heat welding in an electrically heated jig. Jointing and fixing of water-bars shall be carried out strictly in accordance with the manufacturers written instructions. The water-bars shall be installed so that they are securely held in their correct position during the placing and compacting of the concrete. Where reinforcement is present adjacent to water-bars, adequate clearance shall be left between the reinforcement and water-beds to facilitate of the concrete.

3.33 CRACKS If any cracks develop in the reinforced cement concrete construction which in the opinion of the Consultant may be detrimental to the strength of the construction, the contractor at his own expense shall test the structural element in question If under these test loads the cracks shall develop further the contractor at his own expense shall dismantle the construction, cart away the debris, replace the construction and carry out all consequential work there to at no extra cost. If the cracks are not detrimental to the stability of the construction in the opinion of the Consultant, the contractor at his own expense shall grout the cracks with pneumatically applied mortar. At his own expense and risk he shall also make good all other building works such as plaster, molding, surface finish of floods, roofs, ceiling etc. which in the opinion of the Consultant have suffered damage either in appearance or stability owing to such cracks. The repair work shall be carried out to the satisfaction of the Consultant/Project-in-charge. The decision of the Consultant/Project-in-charge as to the extent of the liability of the contractor in the above matter shall be final and binding on the contractor.

3.34 SUPERVISION 5 kg 1 No 500 gms 1 No. 2kg 2 Nos. 200 gms 1 No. 1 kg 1 No. 100 gms 1 No. All concreting work shall be done under strict supervision of the qualified and experienced representatives of the Contractor as well as those of the Consultant The contractor’s Engineer and supervisor who are incharge of concreting work shall be skilled in this class of work and shall personally supervise all the concreting operations. Special attention shall be paid to the following:-

(a) Proportioning, mixing and quality testing of the materials with particular control on the water cement ratio.

(b) Laying of material in place and thorough compaction of the concrete to ensure solidity and freedom from voids and honey combing.

(c) Proper curing for the requisite period.

(d) Reinforcement and inserts/embodiments position are not disturbed during concreting and consolidation by vibration.

3.35 QUALITY CONTROL The Consultant/Project-in-charge reserves the right to make changes in the mix proportions including the increased cement content or/and a change in the Contractor's control procedure, should the quality control during progress of the works prove to be inadequate in his opinion. All the concrete work shall be true to level, plumb and square within the acceptable tolerance. The corners, edges and rises in all cases shall be unbroken and finished properly and carefully.

3.36 TOLERANCES The acceptable tolerances for formed concrete surfaces shall be given below: -

a) Variation from plumb for –

i. Columns and walls to be rendered 6 mm in 3 meters

ii. Exposed columns and walls 3 mm in 3 meters

b) Variation in cross sectional dimensions of columns and beams and in the thickness of slabs and walls: - 6 mm & + 12 mm All the works executed beyond the tolerance limits are liable to be rejected and no extra cost shall be paid to the contractor for reconstructing the same as desired by the Consultant/Project-in-charge.

3.37 TESTING ROOM A testing room of not less than 10 sqm equipped with the following apparatus and qualified concrete technician, labour and materials required for carrying out tests therein shall be provided by the contractor at his own cost: 1. Sieve Set (For aggregate 20 mm down) 40 mm, 20 mm, 16 mm, 12.5 mm, 10 mm, 4.75 mm, 600 micron, 300 micron, and 75 micron having diameter of 45 cms. 2. Weighing a) Physical balance cap. 200 gms with weigh box (accuracy 0.5 gm) b) Counter Scale cap 20 Kg c) Weights 3. Slump Cones 2 Nos 4. 15 cms moulds 18 no. 5. Electric/Kerosene Heater 6. Pans etc. as directed by the Consultant 7. Measuring Cylinders of 1000 ml., 500 ml and 100ml. 8. Wash bottles of the Capacity of 500 ml., 2 Nos. 9. Sink 10. Work benches, shelves, desks and any other furniture and lighting as required by the Consultant. 11. Spring balance dial type cap. 100 kg 12. Litre measures a) 10 Lit 1 No. b) 5 Lit 1 No. c) 2 Lit 2 Nos d) 1 Lit 1 No. e) 1/2 Lit 1 No. 13. Cube Testing Machine 100 Tons. 14. Oven. 15. Cores/ Apparatus for conducting Proctor Density Tests.

3.38 CO-ORDINATION OF WORK The contractor is fully responsible for coordinating with the other agencies for sanitary, electrical work, etc. to ensure execution of their work related to commencement of concreting. Nothing extra shall be payable to the contractor, if the works pertaining to concreting have to be dismantled and redone due to lack of coordination on the part of the contractor in ensuring completion of works of such agencies before concreting had been undertaken.

4 SPECIFICATIONS FOR STEEL REINFORCEMENT

4.1 GENERAL

4.1.1 DESCRIPTION This section covers the requirements for fabricating, delivering and placing of steel reinforcement in position for casting all types of concrete work

4.1.2 RELATED WORK SPECIFIED ELSEWHERE Applicable Codes and Standards: The codes and standards generally applicable to the work in this sections are listed below: - IS: 280 Mild wire for general engineering purpose IS: 432 Part I Mild steel and medium tensile steel bars Part II Hard drawn steel wire IS: 456 Code of practice for plain and reinforced concrete IS: 1139 Hot rolled mild steel, medium tensile steel and high yield strength steel deformed bars for concrete reinforcement IS: 1566 Hard drawn steel wire fabric for concrete reinforcement IS: 2502 Code of Practice for bending and fixing of bars for concrete reinforcement The following clauses are intended to amplify the requirements of the reference documents listed above and the contractor/Project-in-charge shall comply with these clauses.

4.2 SUBMITALS

4.2.1. BAR BENDING SCHEDULE The Contractor shall prepare Bar Bending Schedule for reinforcement before fabrication 4.3 MATERIALS

4.3.1 STEEL REINFORCEMENT Steel reinforcement to be procured by the Contractor for works shall be either of the following types:-

(a) Mild steel of Grade 1 tested quality conforming to IS: 432-Part-

(b) 3370 Code of practice for concrete structures for (Part I to IV) the storage of liquids

(c) High yield strength cold worked deformed steel bars of tested quality conforming to IS: 1786 or hot rolled high tensile deformed steel bars of tested quality conforming to IS: 1139.

(d) Hard drawn steel fabric conforming to IS: 1566.

(e) Where galvanized reinforcement is specified in the drawings, the bars or mesh shall be hot-dip galvanized after bending generally in accordance with IS: 2629 and IS: 4759. Galvanized reinforcement shall be coated with a layer of zinc no where less than 0.05 mm in thickness. All reinforcement shall be stored horizontally above ground level on supports, skids or other approved supports, clear of any running or standing water. Contact with soil should be avoided. Proper drainage and protection from the elements shall be provided to minimize corrosion. Before steel reinforcement is placed in position, the surface of the reinforcement shall be cleaned of rust, dust, grease and other objectionable substances. In order to confirm the quality periodical tests as specified as the relevant IS shall be conducted by the contractor at his own cost.

4.3.2. BINDING WIRE Binding wire shall be black annealed steel wire conforming to IS: 280 and of minimum 18 gauge.

4.3.3. WELDING ELECTRODES used for welding of steel bars shall be of ordinary mild steel grade electrodes conforming to IS: 814 and shall be of the best quality approved by Consultant/Project-in-charge.

4.4 STORAGE Reinforcement steel shall be handled and stored in a manner that bending or distortion of the bars is avoided and contamination of steel is prevented. All reinforcement shall be stored horizontally above ground level on supports, skids or other approved supports, clear of any running or standing water Contact with soil should be avoided. Proper drainage and protection from the elements shall be provided to minimize corrosion Bars of different classifications and diameters shall be stored separately A record shall be kept of the batch numbers of reinforcement deliveries in such a form that the part of the works in which particular reinforcement is used can be readily identified. Welding electrodes shall be stored in moisture control-led environment in accordance with the manufacturer's recommendations.

4.5 FABRICATION Reinforcement steel shall be carefully and accurately cut, bent or formed to the dimensions and configurations shown on the drawings and as per bar bending schedules approved by the Consultant / Projectin-charge. All reinforcement shall be bent cold using appropriate pin size. Bars may be preheated only on approval of the Consultant. Quenching shall not cool hot bars. Bends shall be in accordance with IS: 2502. It shall be ensured that the bars are not straightened in any manner that will injure the material. Any bars incorrectly bent shall be used only if means for straightening and rebinding be such as not to affect adversely the material. Reinforcement shall not be re-bent or straightened without prior review by the Consultant. No reinforcement shall be placed in position on the works without approval of the Consultant, whether or not it is partially embedded in hardened concrete. Reinforcement steel having a reduced section, visible transverse cracks in bends, or otherwise damaged in anyway shall not be used. Spiral reinforcement shall be accurately fabricated to the diameter and pitch shown on the drawings. One and one half finishing turns shall be provided at both top and bottom unless shown otherwise. Cut ends of galvanized rods shall be given a protective coat of an approved zinc paint immediately after cutting.

4.6 LAPPING As far as possible bars of maximum length available shall be used. All bars shall be in one length unless otherwise shown on the drawings or agreed with the Consultant/Project-in-charge. Laps shown on the drawings or otherwise specified by the Consultant shall be based on the used of bars of maximum length by the contractor. In case the Contractor wishes to use shorter bars, laps shall be provided at the Contractor's cost in the manner and locations approved by the Consultant /Project-in-charge. Not more than 1/3 rd of the bars or as specified in the drawings shall be lapped at one section. Reinforcement bars shall not be welded unless shown on the drawings or instructed by the Consultant / Project-in-charge.

4.7 PLACEMENT All reinforcement shall be placed accurately and maintained in the position indicated on the drawings. The contractor shall provide approved type of supports for maintaining the bars in position and ensuring required spacing and correct cover of concrete to the reinforcement as called for in drawings. Pre-cast cement concrete blocks of required shapes and size, MS. chairs and spacers bars shall be used in order to ensure accurate positioning of reinforcement. Pre-cast concrete blocks shall be cast well in advance and shall be at least equal in quality to the class of concrete specified in the work. In fair faces of concrete, temporary spacers only shall be used and removed or withdrawn as compaction of concrete proceeds. Spacers will not be permitted to be left in fair faces of concrete. All intersections of the reinforcements shall be securely tied with two strands of binds wire twisted tight to make the skeleton or net work rigid so that the reinforcement is not displaced during placing of concrete. Tack welding of crossing bars shall not be done except as authorized or directed by the Consultant / Projectin-charge. Nothing extra will be paid for tack welding. The contractor shall take all responsible precautions to ensure that when handling or erecting reinforcement no damage shall be done to finished concrete . Bars that are partially embedded in

concrete shall not be filed bent unless concurrence has been obtained from the Consultant / Project-in-charge. Walkways and borrow runs for placing and compacting the concrete shall be independent of the reinforcement. Loose binding wire and other extraneous metal shall be removed from inside the form work prior to concrete placing. Without relieving the Contractor of the responsibilities for the correctness thereof, the reinforcement shall be inspected and approved by the Consultant in writing before any concrete is placed and the contractor shall allow sufficient time for such inspecting and any subsequent remedial action to be carried out No part of the reinforcement shall be used for conducting electrical currents.

4.8 COVER TO REINFORCEMENT Unless shown otherwise on the drawings, minimum cover for all reinforcement shall be provided as per IS: 456 care shall be taken to maintain the correct cover to reinforcement. For concrete members exposed to weather, earth, action of harmful chemicals, acid vapor, saline atmosphere, sulphurous smoke etc minimum cover for reinforcement shall be increased by 15 cm to 40 mm as directed by the Consultant / Project-in-charge. The maximum cover for reinforcement shall not be greater than that specified above or shown on the drawings plus 10 mm except for bundled bars. For bundled bars, minimum, concrete cover shall be equal to the equivalent diameter of the bundle but need not be greater than 50 mm. Exposed reinforcement intended for binding with future extensions shall be protected from corrosion as shown in the drawings.

4.9 CLEANING After placing, the reinforcement shall be maintained in a clean condition until the concrete is placed. On no account the bars shall be oiled or painted or mould oil used on the formwork be allowed to come in contact with the bars. Before concreting is commenced, the bars shall be thoroughly cleaned with dry gunny bags if they are coated lightly with rust or other impurities.

4.10 WORK WILL INCLUDE

a) All cutting to lengths, labour in bending and cranking, forming hook ends, handling, hoisting and all that is necessary to fix reinforcement in work as per Drawings and specifications This shall also include all that is fairly intended and is necessary for completion of work.

b) Cost of pre-cast concrete cover blocks to maintain cover and holding reinforcement in position, chairs, spaces, dowels, pins, laps, etc.

c) For fabricating and fixing reinforcement in any structural member irrespective of its location, dimension and level.

d) Work at all levels.

e) All the above mentioned works shall be included in the quoted rates Nothing extra shall be payable to the contractor on this account f) Reinforcement Steel procurement shall be done by the Contractor.

5 SPECIFICATIONS FOR FORMWORK

5.1 GENERAL

5.1.1 DESCRIPTION This section covers the requirements for providing, fabricating and erecting of form work including propping, bracing, shoring, strutting, rising, bolting, wedging and all other temporary

and all other temporary supports to the concrete during the process of setting subsequent removal of forms.

5.1.2 RELATED WORK SPECIFIED ELSEWHERE a. Cast-in-place Reinforced Concrete

5.1.3 APPLICABLE CODES AND STANDARDS The codes and standards generally applicable to the work of this section are listed hereinafter IS: 456 Code of practice for plain and reinforced concrete. IS: 4990 Ply wood for concrete shuttering work.

5.2 SUBMITTALS

5.2.1 TYPE OF FORM WORK Prior to start of delivery of material for formwork, the contractor shall prepare samples of different types of formwork for about 10 sqm and obtain approval of the Consultant/Project-in-charge.

5.2.2 DESIGN OF FORMS Before fabricating of forms, the contractor shall submit design calculations for proposed form work to Consultant/Project-in-charge for his approval However, the approval of his responsibility for adequately constructing and maintaining the forms so that they will function properly.

5.2.3 TIE BOLTS In case the contractor proposes to use tie bolts running through the concrete, the location and size of such tie bolts shall be submitted to the Consultant/Project-in-charge for his Approval.

5.3 MATERIALS

5.3.1 Formwork shall be timber, plywood, steel or any other material capable of resisting damage to the contact faces under normal conditions of erecting forms, fixing steel and placing concrete. The selection of materials suitable for formwork shall be made by the Contractor based on the maximum quality consistent with the specified finished and safety.

5.3.2 TIMBER Timber used for formwork shall be easily workable with nails without splitting. It shall be stable and into liable to warp when exposed to sun and rain or wetted during concreting.

5.3.3 PLYWOOD Plywood used for formwork shall be 12 mm thick shuttering quality plywood complying with IS: 4990 and of make approved by the Consultant

5.3.4 STEEL Steel form work shall be made of minimum 2 mm thick or more as required black sheets stiffened with angle iron frame made out of M S angles 40 mm X 6mm.

5.4 DESIGN CRITERIA Formwork shall be designed for the loads and lateral pressures due to dead weight of concrete, superimposed live loads of workmen, materials and plants and for other loads as indicated on the drawings. Forms shall be designed to have sufficient strength to carry on the hydrostatic head of concrete as a liquid without deflection tolerances exceeding the acceptable limits. Where necessary to maintain the tolerances indicated on the drawings. The formwork shall be cambered to compensate for anticipated deflections due to the weight and pressure of the fresh concrete, and also due to any other construction loads. Unless otherwise shown or specified, the camber shall be provided as below:- Types of member Compression Steel Camber As % of tensile steel Co-efficient Simple span 0% 0.066 Continuous Restrained 50% 0.037 span Cantilever

Cantilever 0% 0.032 50% 0.020 0% 0.086 50% 0.046 Camber in cms Where (K X L X 2.54)/D K = Camber coefficient L = Length of member in meter D = Depth of member in meter

5.5 ERECTION OF FORMWORK Forms shall be used wherever necessary to confine the concrete during vibration and to shape it to the required line. The formwork shall conform to shapes, lines, levels and dimensions of the concrete sections shown on the drawings. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of concrete and shall be maintained rigidly in position. Form work shall be adequately supported by adequate number and size of struts, braces, ties and props to ensure rigidity of forms during concreting. Where props rest on natural or filled up ground, to avoid any settlement, the soil shall be thoroughly compacted and bases of props shall be sufficient size so as to restrict the bearing on the ground to 50 t/ sqm Forms shall be tight enough to prevent loss of mortar from the concrete and to produce dense, homogenous and uniformly coloured concrete completely free from honeycombing or surface roughness. Joints in formwork shall be designed to prevent leakage, not only between individual elements forming the panels but also from the horizontal and vertical junction between the panels themselves. If form work is held together by bolts or wires, those shall be so fixed that no reinforcement bar is exposed on surface against which concrete is to be laid. The Consultant may at his discretion allow the contractor to use tie bolts running through the concrete at his own cost. Hole left in the concrete by these tie-bolts shall be filled as specified by him at the Contractor’s expense. Formwork shall be constructed so as to facilitate loosening and permit removal without jarring the concrete Wedges, clamps and bolts shall be used wherever practicable instead of nails. All formwork erected shall be approved by the Consultant/Project-in-charge before concreting is started.

5.6 CLEANING AND OILING OF FORMS At the time concrete is placed in the forms, the surface of the forms in contact with the concrete shall be free from encrustations of mortar, grout or other foreign materials. Temporary openings shall be left at the bottom of formwork to enable, sawdust, shavings, wire cuttings and other foreign material to be worked out form the interior of the forms before the concrete is placed. The surface of the forms to be in contact with the concrete shall be coated with an approved coating that will effectively prevent sticking and will not stain the concrete surfaces. After each use the surfaces of forms in contact with concrete shall be cleaned, well settled and treated with form oil approved by the Consultant Project-in-charge. Lubricating (machine) oils shall not be used. Oiling shall be done before reinforcement has been placed and care shall be taken that no oil comes in contact with the reinforcement while it is being placed in positions. Immediately before concreting is commenced the formworks shall be carefully examined to see that all dirt, shavings, sawdust and other refuse have been removed and the formwork shall be wetted thoroughly to prevent absorption of water from concrete. The formwork shall be kept wet during concreting and for the whole time that it is left in place.

5.7 REMOVAL OF FORM WORK Form works shall be removed carefully so as to prevent damage too the concrete. Wooden wedge only shall be used between the concrete surface and the form where force is necessary to separate the form from the concrete. Metal wedge, bars or tools shall not be used for this purpose. Any concrete damaged in the process of removing the forms shall be repaired in accordance with the provision of concrete specifications. Unless otherwise permitted by the Consultant, the forms shall not be stripped in less than the minimum periods specified in IS: 456. However the Consultant may increase the above period if he considers it necessary for structural stability All non-supporting forms shall be loosened and removed during regular working hours, and as soon as the concrete has hardened sufficiently to prevent damage from the removal of the forms All false work and forms supporting concrete beam and slabs, or other members subject to direct

bending stress, shall not be removed or released until the concrete has attained sufficient strength to ensure structural stability and to carry both the dead and live loads including any construction loads which may be placed upon it. No construction loads exceeding the combination of superimposed dead load plus specified live load shall be supported on any unshared portion of the structure under construction, unless analysis indicates adequate strength to support such additional loads Form work shall be removed in such a manner so as not to impair safety and serviceability of the structure It shall be removed gradually to prevent sudden application of loads to the concrete All concrete to be exposed shall have sufficient strength to prevent any damage caused by removal of formwork.

5.7.1. HACKING: Immediately after removal of forms, the concrete surface intended to be either plastered or finished, shall be roughened with brush hammer or with chisel and hammer as directed by the construction manager to make the surface sufficiently coarse and rough to provide a bonding key for plaster. No extra payments shall be made to the Contractor for such work on concrete surface after removal of the form work. No payment shall be made for temporary formwork used in concreting, or for form work required for joints or bulk-heads, in floor or elsewhere, whether such joints are to be covered later with concrete or mastic or other materials.

5.7.2. POCKETS AND OPENINGS: Where boxes, pockets or openings are required (not exceeding 0.1 sqm) to be formed in the concrete. No deduction shall be made for the area of box or pockets in measuring the area of concrete surface shuttered. In other words the area of shuttering shall be reckoned as if box of pocket or openings were not present. However, on measuring the concrete quantity, the volume of the box or pocket shall be deducted. If the area of box or pocket or openings against the shuttered faces exceeds 0.1 sqm. It shall be paid not as a box or pocket or opening but as formwork at the rates for formwork. No extra payment shall be made for holes to be made in the form work for inserting electrical conduits hooks for fans etc.

5.8 REUSE OF FORMS Immediately after the forms are removed, they shall be cleaned with jet of water and a soft brush before they are reused. The contractor shall not be permitted reuse of any forms which in the opinion of the Consultant has worn out and has become unfit for formwork. The Consultant/Project-in-charge may in his absolute discretion, order rejection of any forms he considers unfit for use in the works, and order their removal from the site.

11 SPECIFICATION FOR PLASTERING WORK

11.1 SCOPE The Contractor shall furnish all labour, materials scaffolding, equipment, tools, plants and incidentals necessary and required for the completion of all plaster work.

11.2 GENERAL Plaster as herein specified shall be applied to all internal surface where called for All plaster work shall be executed by skilled workmen in a workman like manner and shall be of the best workmanship and in strict accordance with the dimensions on drawings subject to the approval of the Consultant/Engineerincharge. The primary requirement of plaster work shall be to provide dense, smooth and hard enclosure and devoid of any cracks of the interior and/or exterior.

11.3 SCAFFOLDING Double scaffolding having two seats of vertical supports shall be provided The supports shall be sound and strong, tied together with horizontal pieces over which scaffolding planks shall be fixed. The contractor shall get the scaffolding approved from the Consultant well in advance.

11.4 CHASING AND BREAKAGE Fixing of door and window frame, shall be completed before any plaster work is commenced on a surface. No chasing or cutting of plaster shall be permitted normally. However, if the same is felt unavoidable at places, written permission shall be obtained from the Consultant before cutting any such plaster. Broken corners shall be obtained from the Consultant before cutting any such plaster, Broken corners shall be cut back out less than 150 mm on sides and patched with cement mortar as directed. All corners shall be rounded to a radius of 80 mm or as directed by the Consultant.

11.5 PREPARATION Masonry and concrete surfaces which call for application of plaster shall be clean, free from dust and loose mortar. Effloresecence if any shall be removed by brushing and scrapping. For masonry surfaces the joints shall be raked out properly, while the concrete surfaces shall be roughed by wire brushing and hacking to provide the key, thereby ensuring proper bond to the satisfaction of the Consultant. The surface shall then be thoroughly washed with water, cleaned and kept wet before plastering is commenced.

11.6 CHICKEN WIRE MESH Galvanized chicken mesh (22 gauge, 12 mm size) shall be provided at junctions of brick masonry and concrete members, to be plastered and other locations as called for, properly stretched and nailed with galvanized wire nails, ensuring equal thickness of plaster on both sides of the mesh. The width of the mesh shall be as approved by the Consultant / Project-in-charge. The chicken mesh wherever. Specified, shall be fixed in place before plastering.

11.7 Samples of each type of plaster shall be prepared well in advance of undertaking the work for the approval of the Consultant/Project-in-charge 11.8.1 MORTAR The mortar of the specified mix shall be used Mortar shall be prepared as specified under" Brick Work". It shall be made in small quantities, as required, and applied within 15 minutes of adding water to the plaster mix

11.8.2 CEMENT: Cement shall be as per specifications under "Concrete Work"

11.8.3 WATER: Water shall be as per specifications under "Concrete Work"

11.8.4 SAND For plaster work normally clean fine river sand shall be used. However, if specified in the drawing or schedule of finishes, coarse sand conforming to the specifications under Concrete work" shall be mixed with fine river sand in proportion specified or directed by the Consultant.

11.8.4 WATER PROOFING COMPOUND FOSROC, ROFFE Chemicals or approved equivalent as approved by Consultant / Project-in-charge wherever specified.

11.9. CEILING PLASTER 6mm thick Ceiling plaster shall be completed before commencement of wall plaster. Plastering shall be started from the top and worked down towards the floor. To ensure even thickness and true surface, plaster about 15 x 15 cm shall be first applied, horizontally and vertically, at not more than 2 meters intervals over the entire surface to the plaster to serve as gauges. The surface of these gauged areas shall be truly in place of the finished plaster surface. The mortar shall be laid between the gauges with a trowel ensuring through filling of joints. The mortar shall be applied in a uniform surface slightly more than the specified thickness and then brought to a true surface, by working a wooden straight edge reaching across the gauge, with small upward and side movements at a time. Finally the surface shall be finished off true with trowel or wooden float according as a smooth or a sandy granular texture is required. Excessive trawling or over working the float shall be avoided. All corners, arises angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished. Rounding or chamfering corners, arises, junctions

etc. Where required shall be done without any extra payment. Such rounding shall be carried out with proper templates to the sizes required. No portion of the surface shall be left out initially to be patched up late on. Grooves shall be provided at the junction of ceiling and wall plaster without any extra cost. In suspending work at the end of the day, plaster shall be left, cut clean to line both horizontally and vertically. When recommencing the plastering, the edge of the old work shall be scraped, cleaned and wetted with cement slurry before plaster is applied to the adjacent areas, to enable the two to be properly joined together. Plastering work shall be closed at the end a of day on the body of the surface and not nearer than 15 cm to any corners or arises. It shall not be closed on the body of the features such as pilasters, bands and cornices. Horizontal joints in plaster work shall not also occur on parapet tops and copings, as these invariably lead to leakages.

11.9.1 GROOVES Wherever directed all joints between concrete and brick masonry besides other locations as called for shall be expressed by a groove cut in plaster at no extra cost

11.9.2 FINISH The plaster shall be finished to a true and plumb surface and to the proper degree of smoothness as required The work shall be tested frequently as the work proceeds with a true straight edge not less than 2.5 m long and with plumb bobs All horizontal lines and surfaces shall be tested with a level and all jambs and corners with a plumb bob as the work proceeds.

11.9.3 CURING Curing shall be started as soon as the plaster has hardened sufficiently not to be damaged when watered. The plaster shall be kept wet for a period of atleast 7 days. During this period, it shall be suitably protected from all damages

11.9.4 PRECAUTION Any cracks which appear in the surface and all portions, which sound hollow when tapped or are found to be soft or otherwise defective shall be cut out in rectangular shape and redone as directed by the Consultant

11.9.5 FLOATING COAT OF NEAT CEMENT Where finishing with a floating coat of neat cement is specified in the drawings or directed by the Consultant, specification, for this item of work shall be same described above except for the additional floating coat which shall be carried out as below. When the plaster has been brought to a true surface with the wooden straight edge, it shall be uniformly treated over its entire area with a paste of neat cement and rubbed smooth, so that the whole surface is covered with neat cement coating. The quantity of cement applied for floating coat shall 1 kg. per sq. mt. smooth finishing shall be completed with trowel immediately and in no case later than half an hour of adding water to the plaster mix.

11.10 BEARING PLASTER This shall be consist of cement plaster 1:3(1 cement : 3 coarse sand) 20 mm thick finished with a coat neat cement laid on top of walls as bearing for RCC lintels, beams and slabs. When dry, a thick coat of lime wash shall be given.

46 15. LIST OF APPROVED MAKES/AGENCY OF MATERIALS (FOR CIVIL WORK) The following guidelines are to be noted with regard to use of materials in the work.

1. The CONTRACTOR shall be required to use material of the make given in the list of approved make or specifically mentioned in the Bill of Quantitys . EMPLOYER is free to demand the CONTRACTOR to use any particular make from the approved list of items. However in case of non availability of any item as per the list of approved make CONTRACTOR shall use alternative item of ISI make with prior written permission from the CONSULTANT/Project-in-charge.

2 Wherever, material bearing Standard Mark (ISI) are used in the work, the Contractor should furnish necessary documents and proof of payments made for the procurement of materials bearing Standard Mark (ISI).

3. In case it is established that Standard material (bearing ISI mark) as well as the materials indicated in the list (as mentioned in the above para) are not available in the market, then approved equivalent materials may be used in the work subject to approval from the consultant and Project-in-charge.

4. For materials bearing "Standard Mark (ISI)" ordinarily no testing is to be done. However, in case of doubt or with a view to check the quality of materials, Project-in-charge may send samples for random testing.

5. For use of materials other than materials bearing "Standard Mark (ISI)" Mandatory tests shall be conducted at the frequency specified in the contract. In case frequency of testing is not stipulated in the contract then standard specification (CPWD, ISI etc.) may be considered for frequency at which materials are to be tested.

6. Before bulk purchase of quantities of materials, it is the responsibility of the Contractor to get the samples of materials approved from consultant and Project-in-charge Sl. No. MATERIALS APPROVED MAKE/APPROVED AGENCY

1. Antitermite emulsifiable concentrate As per CPWD/PWD specifications and ISI marked

2. Damp proof materials / water proofing compound Impermo, Duraseals, Acco-proof, CICO etc., Duraseed, STP, GE Silicon, Pidilite. Fosroc, Sika

3. Reinforcement steel Tata, SAIL, RINL as approved (Primary manufacture)

4. Structural steel section Tata, SAIL, RINL as approved (Primary manufacture)

5. Portland Slag cement Lafarge, ACC, Ultratech, Konarak as per I.S. 455 as approved

6. White cement JK white, Birla white

7. Aluminum glazing section Hindalco . Indal, Jindal

8. Al. Glazing fabrication As approved by CIPET/Consultant

9. Anodised aluminum hard ware fittings Everite , Sigma, Opel, NU-LITE, Jyothi, Allen of I.S.I Marked

10. Locks Godrej, Harrison

11. Door closers Dorma/Godrej

12. Float glass Asahi float, Modi float, Hindustan Glass Company, 97

13. Wire mesh Sterling Enterprises, Trimurty welded mesh

14. Distemper Berger, Asian paints, Nerolac as approved

15. Synthetic enamel paint J & N, Berger, Shalimar, Asian paints, Nerolac, ICI as approved

16. Plastic emulsion paint Asian paints, Berger , Nerolac, ICI, J&N, Shalimar

17. Water proof cement paint Snowcem, Asian paints, Nerolac, Berger as approved

18. Glazed ceramic tiles Johnson, Somany, Kajaria, Spartek

19. Unglazed ceramic tiles Bell, Kajaria, Somany, Johnson.

20. Ceramic border tiles 3” wide Johnson, Somany, Kajaria, Spartek

21. Cement concrete tiles Eurocon, Pavit, Duracrete

22. Vitrified granamite tiles Johnson, Bell Granito, NITCO

23. Floor spring for Alu. Door & Door closer Dorma/Godrej

24. Bitumen Indian oil, Hindustan petroleum, Bharat Petroleum

25. Chemical Impregnated Water Proofing / Brickcoba Water Proofing Agencies Overseas Water Proofing Co., Hindustan water Proofing, Indian Water Proofing, National Water Proofing, SIKA, FOSH ROCKS.

26. Flush doors Anchor, Kitply, Greenply, Moyur, Woodcraft, Alpro, I.S.I. Marked

27. Laminates Decolam, Greenlam, Formica, National ,

28. Mirror Modi, Saint Gobain, Atul

'29. Copolymer Acrylic aggregate Paints Heritage or equivalent

30. Wooden flooring NOVO floor, COSMO floor, PERGO floor

31. Electronic automatic door Dorma or equivalent

98 16. LIST OF DOCUMENTS/REGISTERS TO BE MAINTAINED AT SITE FOR ENSURING PROPER QUALITY CONTROL OF WORK IN PROGRESS

1. A complete set of Contract Documents.

2. A complete set of drawings (Tender drawings and Good for Execution Drawings).

3. A complete set of change in specification or scope if any.

4. Material Test Register (Master Register) indicating details of various other Test Registers.

5. Cement Test Register.

6. Aggregates Test Register i) Fine aggregate-sand ii) Coarse aggregate

7. Cube Test Register

8. Register for anti-termite material used in the work.

9. Register for bricks testing.

10. Bar bending schedule Register/Pour Cards.

11. Concrete Pouring Register.

12. Paint Test Register.

13. Register for approval of samples for various materials.

14. Site Order Book.

15. Register showing use of non specified materials and reasons thereof.

16. Hindrance Register

17. Cement & steel consumption register.

18. Levels-Record registers (for earth filling, roadwork).

19. Daily records pertaining to labour deployment.

20. Records for all the deviations during the execution of work to be maintained.

21. Records for bitumen consumption register.

22. Paint consumption register.

23. Water proofing compound consumption register.

24. Measurement Book

A P P E N D I X – I

B I L L F O R M AT R U N N I N G A/C B I L L

i. Name of work : ii. Name of Employer : iii. Name of Contractor : iv. Accepted contract amount : v. Date of Commencement : vi. Stipulated date of Completion : vii. Actual date of completion (applicable for final bill only) : viii. Extension, if any. : ix. Insurance valid upto :

a) Workmen Compension Act

b) Contractor's all risk comprehensive insurance policy : x. Labour Licence No. and date and valid upto : xi. Serial No. of this Bill : xii. No. & Date of previous Bill : xiii. Ref. to Agreement dated : xiv. Earnest Money Deposit : 122 122 Technical Bid documents

TECHNICAL SPECIFICATIONS FOR MANDATORY TESTS VOLUME V OF V 123 123 Technical Bid documents MANDATORY TESTS

1. The mandatory tests shall be carried out when the quantity of materials to incorporate in the work exceeds the minimum quantity specified.

2. Optional tests specified or any other tests, shall be carried out in case of specialized works or important structures as per direction of the Engineer-in-Charge.

3. Testing charges, including incidental charges and cost of sample for testing shall be borne by the contractor for all mandatory tests.

4. Testing charges for optional tests shall be reimbursed by the Department. However, the incidental charges and cost of sample for testing shall be born by the contractor.

5. In case of non-IS materials, it shall be the responsibility of the contractor to establish the conformity of material with relevant IS specification by carrying out necessary tests. Testing charges including incidental charge and cost of sample for testing shall be borne by the contractor for such tests.

THE MANDATORY TESTS SHALL BE AS FOLLOWS:

Material Test Field / laboratory test Test procedure Minimum quantity of material / Work for carrying out the test Frequency of testing Reinforced cement concrete work Water for construction purposes Ph value Limits of Acidity Limits of Alkality Percentage of solids Chlorides Suspended matter Sulphates Inorganic solids Organic solids Lab IS 3025 Water from each source Before commencement of work & thereafter: Mandatory - Once in one year from each source; Optional: once in 3 months from each source; Municipal supply - optional. Reinforced cement concrete b) slump test Field IS: 1199 a) 20 cu.m. for slabs, beams and connected columns . b) 5 Cu.m in case of columns a) 20 cu.m. Part there of or more frequently as required by the EIC/Consultant b) Every 5 Cu.m. c) cube test Lab IS : 516 a) 20 cu.m. In slab, beams, & connected columns. b) 5 cum in columns a) every 20 cum of a day's concreting .(Ref. as per frequency of sampling). b) Every 5 cum. Ready mixed cement concrete (IS-4926) Cube test Lab IS-516 and as per para 6.3.2 of IS-4926-2003 50 cum One for every 50cum of production or every 50 batches, whichever is the greater frequency Note : for all other small items and where RCC done in a day is less than 5 cum, test may be carried out as required by EIC/Consultant Material Test Field / laboratory test Test procedure Minimum quantity of material / Work for carrying out the test Frequency of testing Mortars: Lime Chemical & physical properties of lime Laboratory IS; 6932 (part 1 to x) 5 M.T. 10 M.T. or part there of as decided by the EIC/Consultant Sand Bulking of Sand Field 20 CU.M. Every 20 cu.m or part there of or more frequently as decided by EIC/Consultant Silt content Field IS:383 20 CU.M. Every 20 cu.m or part there of or more frequently as decided by EIC/Consultant Particle size and distribution Field or Laboratory as decided by the EIC/Consultant IS:383 40 CU.M. Every 40 cu.m. of fine aggregate / sand required in RCC. Work only Organic Impurities Field ..DO.. 20 CU.M. Every 20 cu.m. or part thereof or more frequently as decided by the EIC/Consultant Chloride & sulphate content tests Optional Once in three months. Cement Test requirement Fineness (m2/kg) IS 4031 (Part-II) Each fresh lot Every 50 MT or part thereof Normal consistency IS 4031 (Part-IV) Settingtime (minute) a) Initial b) Final IS 4031 (Part-V) Soundness a) Le-Chat expansion (mm) b) Auto clave (%) IS 4031 (PartIII) Compressive strength(Mp) a) 72+/-1 hr b)168+/-2hr IS 4031 (PartVI) Technical Bid documents 135 Material Test Field / laboratory test Test procedure Minimum quantity of material / Work for carrying out the test Frequency of testing Stone Aggregate a) Percentage of soft or deleterious materials General visual inspection/ Lab test where required by the EIC/Consultant IS 2386 Part II One test for each source One test for each source Particle size distribution Field / Lab - 10 cu.m Every 40 cum. Or part thereof and Once in three months for each source for coarse and fine aggregates required in RCC works, for a minimum quantity - 10 cum for coarse aggregate and 40 cum for fine aggregate. a) Estimation of Organic impurities Field / Lab IS 2386 Part II 10 Cum -dob) Specific Gravity Field / Lab IS 2386 10 Cum -doa) Bulk Density Field / Lab IS 2386 10 Cum -dob) Aggregate crushing strength Field / Lab IS

2386 10 Cum -doc) Aggregate impact value Field / Lab IS 2386 10 Cum -doTimber Moisture Field (by moisture meter) Laboratory test as required by EIC/Consultant 1 Cu. M. Every one Cum or part thereof Flush Door End immersion test Knife test Adhesion test Laboratory IS: 2202 (Part 1) & Part II 26 shutters As per sampling and testing as instructed by the EIC/Consultant Aluminium door or window fittings Thickness of anaodic coating Laboratory IS: 5523 If the cost of fittings exceed Rs. 20,000/- Rs.20,000/- or part there of as required by the EIC/Consultant. Bricks Testing of bricks / brick tiles for dimensions Compressive strength Water absorption Efflorescence Laboratory IS 3495 Part I to IV No of bricks to be selected & bricks lot 20 : 2001 to 10000 32 : 10001 to 35000. 50 : 35001 to 50000 20 : for every addl. 50000 or part thereof If < 2000, As per decision of the EIC/Consultant Permissible defective bricks in the sample 1 2 3 Technical Bid documents 136 Material Test Field / laboratory test Test procedure Minimum quantity of material / Work for carrying out the test Frequency of testing Steel for RCC Physical tests a) Tensile strength b)Retest c) Re-bound test d) Nominal mass e) Bend test f) Elongation test g) Proof stress Lab / field IS 1608 IS 1786 IS 1786 IS 1786 IS 1599 IS 1786 IS 1786 Each lot from each source from each diameter of bar Below 100 Tons Dia < 10 mm one sample for each 25 tonnes or part thereof If dia is >10 mm but less than 16 mm: One sample each 35 tonnes or part thereof. If dia >16 mm one sample for each 45 tonnes Chemical Tests: 1.Carbon Constituent 2.Sulphur 3.Phosphorus 4.Phosphorus & Sulphur IS 1786 For every fresh lot of one truck or less as directed by the Engineer-inCharge/Consultant Soil core test OMC Proctor density As per IS 12175 Two for every 50 sqm As per notes 1 & 2 below Mosaic tiles As per IS 13801 Para 14.6 5000 tiles and more for each manufacturer & thereafter for every 10000 tiles or part thereof. Ceramic tiles As per IS 13630 3000 tiles and more for each manufacturer and thereafter for every 3000 tiles or part thereof. Technical Bid documents 137 138 138 Technical Bid documents

OTHER MANDATORY TESTS: Soil core tests; Testing aggregate - particle size distribution; Ceramic tiles, Mosaic tiles Testing structural steel; Chequered plate, Unit weight, Thickness, Chemical and physical properties Presence of preservative on factory made panelled door, kiln seasoned chemically treated wood products, Moisture content in wood products. CI pipes: Dimensional, mass, Hydrostatic; GI pipes; Lead; RCC Hume pipes; Stoneware pipes ROAD WORK: Soil core tests; Grading of metal for WBM; Bitumen grade; Bitumen content; Load test on concrete gratings.

OPTIONAL TESTS: Testing aggregate-surface moisture, impact value, spectrographic alkali reaction; Dimensional tests of bricks; Testing the mass of zinc coating on GI door frame, steel windows, test for chemical and physical properties; Anodic coating on aluminium fittings and aluminium sections, Unit weight of aluminium sections; Non destructive Test of Concrete like Non-Destructive Testing(NDT), Ultra Sonic Pulse Velocity (UPV or USPV) by Rebound Hammer (Schmidt Hammer with impact energy of the hammer is about 2.2Nm and with Ultrasonic Pulse Velocity Tester.

TESTING, TOLERANCE, ACCEPTANCE AND MODE OF PAYMENT:

a) The material should pass all tests and tolerance in dimensional, chemical, physical properties should be within the limit as stipulated in relevant IS for acceptance. Such materials shall be accepted as standard.

b) Payment shall be restricted to standard unit mass, or as specified in the schedule of work, without making any cost adjustment towards mass or any other properties, provided the material pass all the tests and tolerances are within the specified limits.

c) In case of non-standard materials, materials not covered under any IS Specifications, such as aluminium sections, the payment shall be made based on the actual unit weight basis as determined by testing at random sampling. Notes:

1. BACK FILLING IN SIDES OF FOUNDATIONS, PLINTH, UNDER FLOOR ETC.: The back filling shall be done after the concrete or masonry has fully set and shall be done in such a way as not to cause under-thrust on any part of the structure. Where suitable excavated material is to be used for back filling, it shall be brought from the place where it was temporarily deposited and shall be used in backfilling. The scope of work for back filling/filling in foundation, plinth, under floors etc. shall include filling for all the buildings covered under the contract. Surplus earth available from one building, if required, shall be used for backfilling/filling for other buildings also within the specified lead mentioned in the item. All timber shoring and form work left in the trenches, pits, floors etc. shall be removed after their necessity ceases and trash of any sort shall be cleared out from the excavation. All the space between foundation masonry or concrete and the sides of excavation s h a l l b e b a c k f i l l e d to the o r i g i n a l s u r f a c e with approved materials in layers not exceeding 150 mm. in thickness, watered and well consolidated by means of rammers to at least 90% of the consolidation o b t a i n a b l e at o p t i m u m m o i s t u r e c o n t e n t (Proctor density). Flooding with water for consolidation will not be allowed. Areas inaccessible to mechanical equipment such as areas adjacent to walls and columns etc. shall be 139 139 Technical Bid documents tamped by hand rammer or by hand held power rammers to the required density. The backfill shall be uniform in character and free from large lumps, stones, shingle or boulder not larger than 75 mm. in any direction, salt, clods, organic or other foreign materials which might rot. The backfilling in plinth and under floors shall be done in similar way in layers not exceeding 150 mm. thick and shall be well consolidated by means of mechanical or hand operated rammers as specified to achieve the required density. Test to establish proper consolidation as required will be carried out by the Contractor cost. Two tests per 50 sqm. will be taken to ascertain the proper consolidation.

2. FILLING IN PLINTH AND UNDER FLOORS:

After the available suitable excavated materials are exhausted as backfilling, the contractor shall notify the Engineer-in-Charge, of the fact and levels taken jointly with Site Engineer / Consultant/Authority of CIPET Authority. The earth, murrum, sand, gravel etc. or such materials suitable for filling proposed to be filled under floors and so mentioned in the item of schedule of quantities shall then be brought to site from approved locations and sources. i) Earth Filling : The earth, soft murrum etc. so brought shall be filled up in layers of 15 cm depth, each layer being well watered and consolidated by approved hand or mechanical tampers or other suitable means to achieve the required density. ii) Gravel or Sand Filling : Gravel if required to be filled under floors, shall be single washed gravel of approved quality and of size varying from 12 mm. to 20 mm. it shall be uniformly blinded with approved type of soil and/or sand to obtain full compaction. Gravel shall be filled in specified thickness and shall be well watered and rammed entirely to the satisfaction of the Site Engineer / Consultant. If sand is required to be filled under floors, it shall be clean, medium grained and free from impurities. The filled in sand shall be kept flooded with water for 24 hrs. to ensure maximum consolidation. Any temporary work required to maintain sand under flooded condition shall be done by the contractor at his own cost. The surface shall then be well dressed and got approved from Site Engineer / Consultant before any other work is taken over the fill. Signature of the Contractor: Address: Chief Manager (Project) Central Institute of Plastics Engineering & Technology Date: NH-31,Changsari, Dist.Kamrup(Assam)-781101

Executive Engineer
WWM-P-K&T Valley Division
BWSSB, Kapila Bhavana, 2nd Floor, 11th main,
35th cross, 4th T block,
Jayanagar,
Bangalore-560041.

SECTION 7: DRAWINGS (Uploaded separately)

SECTION 8:

BILL OF QUANTITIES

Rate (Rs)						
Sl. No.	Description of item (with brief specification and reference to Book of specification)	Quantity	Unit	In figures	In words	Amount (Rs)
Total Tender Price (in figures)						
(in words)						

Note:

(1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities [*refer: ITB Clause 11.2 and CC Clause 37.2*].

(2) Unit rates and prices shall be quoted by the Tenderer in Indian Rupees.

(3) Where there is a discrepancy between the rate in figures and words, the lower of the two will govern. [*ITT Clause 24.1(a)]*

(4) Where there is a discrepancy between the unit rate and the line-item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [*ITT Clause 24.1 (b*)]

Executive Engineer
WWM-P-K&T Valley Division
BWSSB, Kapila Bhavana, 2nd Floor, 11th main,
35th cross, 4th T block,
Jayanagar,
Bangalore-560041.

SECTION 9: FORMAT OF BANK GUARANTEE FOR SECURITY DEPOSIT

To: _____ [name of Employer]
_____ [address of Employer]

WHEREAS _____ [name and address of Contractor] (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____ dated _____ to execute _____ [name of Contract and brief description of Works] (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of Rs._____ [amount of guarantee] [6] Rupees_____[in words], and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ [amount of guarantee][7]as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

---

[6] An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract

[7] An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until 30 days from the date of expiry of the Defects Liability Period.

Signature and seal of the guarantor _____
Name of Bank _____
Address _____
Date _____

Executive Engineer
WWM-P-K&T Valley Division
BWSSB, Kapila Bhavana, 2nd Floor, 11th main,
35th cross, 4th T block,
Jayanagar,
Bangalore-560041.